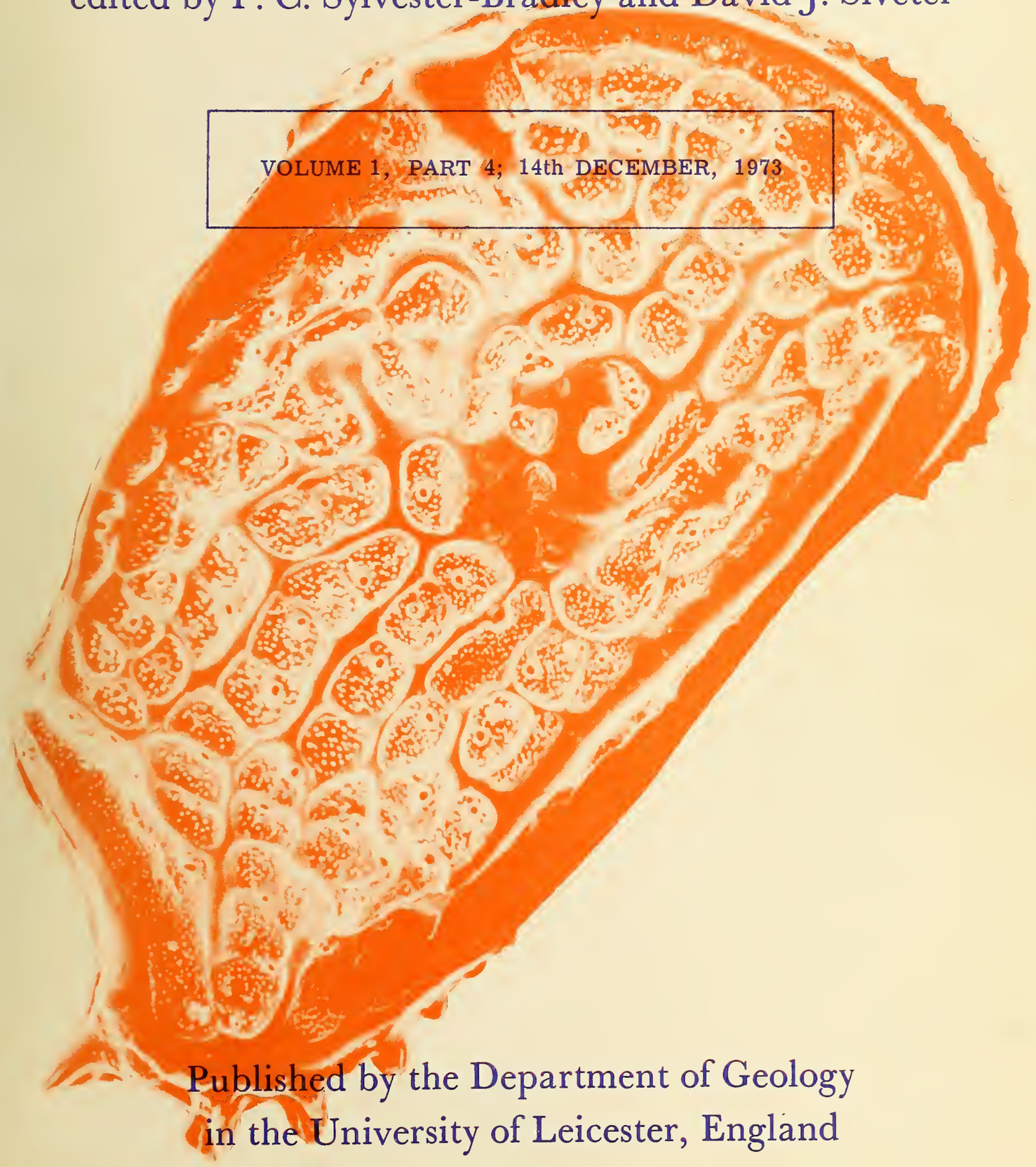
A Stereo-Atlas of Ostracod Shells

edited by P. C. Sylvester-Bradley and David J. Siveter



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Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Full instructions may be obtained on request from the Editors. Format should follow the style set by the majority of papers in this issue. The Editors should be consulted for advice before figures for plates are mounted. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only.

Department of Geology, The University, Leicester.

ACKNOWLEDGEMENTS

The publication of this first volume of the *Stereo-Atlas* has been made possible by the generous financial help of the British Petroleum Company Limited and Shell International Petroleum Company Limited.

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595.337.14 (119.9 + 118.22 + 119.1) (564.3:161.033.35 + 262.2:161.035.36 + 467.3.162.001.38): 551.351

ON *LOCULICYTHERETTA PAVONIA* (BRADY)

by Neriman Doruk
(University of Leicester, England)

Genus *LOCULICYTHERETTA* Ruggieri, 1954

Type-species (original designation): *Cythere pavonia* Brady, 1866

Loculicytheretta pavonia (Brady, 1866)

Cythere pavonia G. S. Brady, *Trans. zool. Soc. Lond.*, vol. 5, p. 378, pl. 61, figs. 2a-d (1866).
Leptocythere (?) *pavonia* (Brady); E. Triebel, *Senckenbergiana*, Bd. 23, no. 4/6, p. 359, pl. 13, figs. 152a, b (1941).
Loculicytheretta pavonia (Brady); G. Ruggieri, *Atti. Soc. ital. Sci. nat.*, vol. 93, p. 571, figs. 40a, b, 41, 41a (1954).

Syntypes: Allen Hancock Museum, Newcastle-upon-Tyne, England (see Sissingh in *The Ostracodologist*, no. 19, p. 4, 1972).

Type locality: Levant, E Mediterranean. Recent; sponge sand.

Explanation of Plate 1:43:238

Fig. 1, ♂ RV, ext.; fig. 2, ♂ LV, ext.; fig. 3, foveolate muri.

Scale A (250 µm ; ×143), figs. 1, 2; scale B (20 µm ; ×529), fig. 3.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 5717 (RV: Pl. 1:43:238, fig. 1), IO 5718 (LV: Pl. 1:43:238, fig. 2), IO 5719 (LV: Pl. 1:43:238, fig. 3), IO 5720 (LV: Pl. 1:43:240, figs. 1, 4), IO 5721 (RV: Pl. 1:43:240, figs. 2, 3), IO 5722 (RV: Pl. 1:43:242, fig. 1; Pl. 1:43:244, fig. 1), IO 5723 (LV: Pl. 1:43:242, fig. 2; Pl. 1:43:244, figs. 2, 3). IO 5717-19 and IO 5723 from Dhavlos Bay, Cyprus; Recent, beach sand; coll. by P. C. Sylvester-Bradley; approx. long. 33°55'E, lat. 35°25'N. IO 5720 from drillings off Iskenderun Bay, S coast of Turkey, approx. 280 m below sea-floor; Plio-Pleistocene; presumed shallow marine; approx. long. 35°59'E, lat. 36°37'N. IO 5721 and IO 5722 from Alicante, Spain, kindly given by G. Ruggieri; beach sand; approx. long. 0°29'W, lat. 38°21'N.

Diagnosis: Rather elongate, 3-5 elongate costae, fossae in between muri faveolate (see Pl. 1:43:238, fig. 3), females with three loculi (see Pl. 1:43:244, figs. 1-3).

Remarks: Adductor scars show a tendency to subdivide (see Pl. 1:43:240, figs. 3, 4). Sexual dimorphism: males without loculi, more strongly developed ornament, and more elongate in shape (see Pl. 1:43:238, figs. 1, 2; Pl. 1:43:242, figs. 1, 2; Pl. 1:43:244, figs. 1-3).

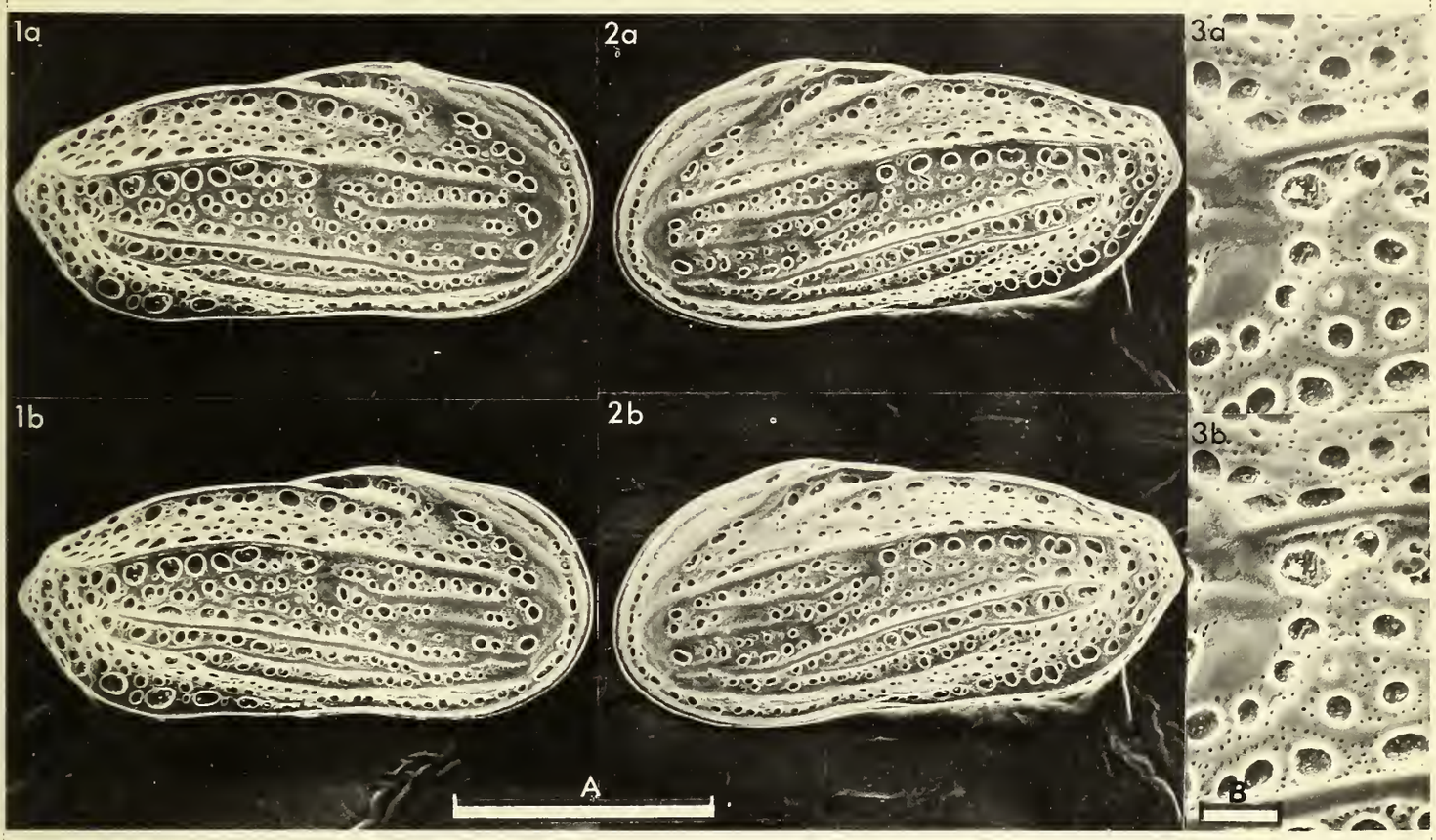
Distribution: Recent in the E and W Mediterranean, Plio-Pleistocene in Italy and Turkey.

Explanation of Plate 1:43:240

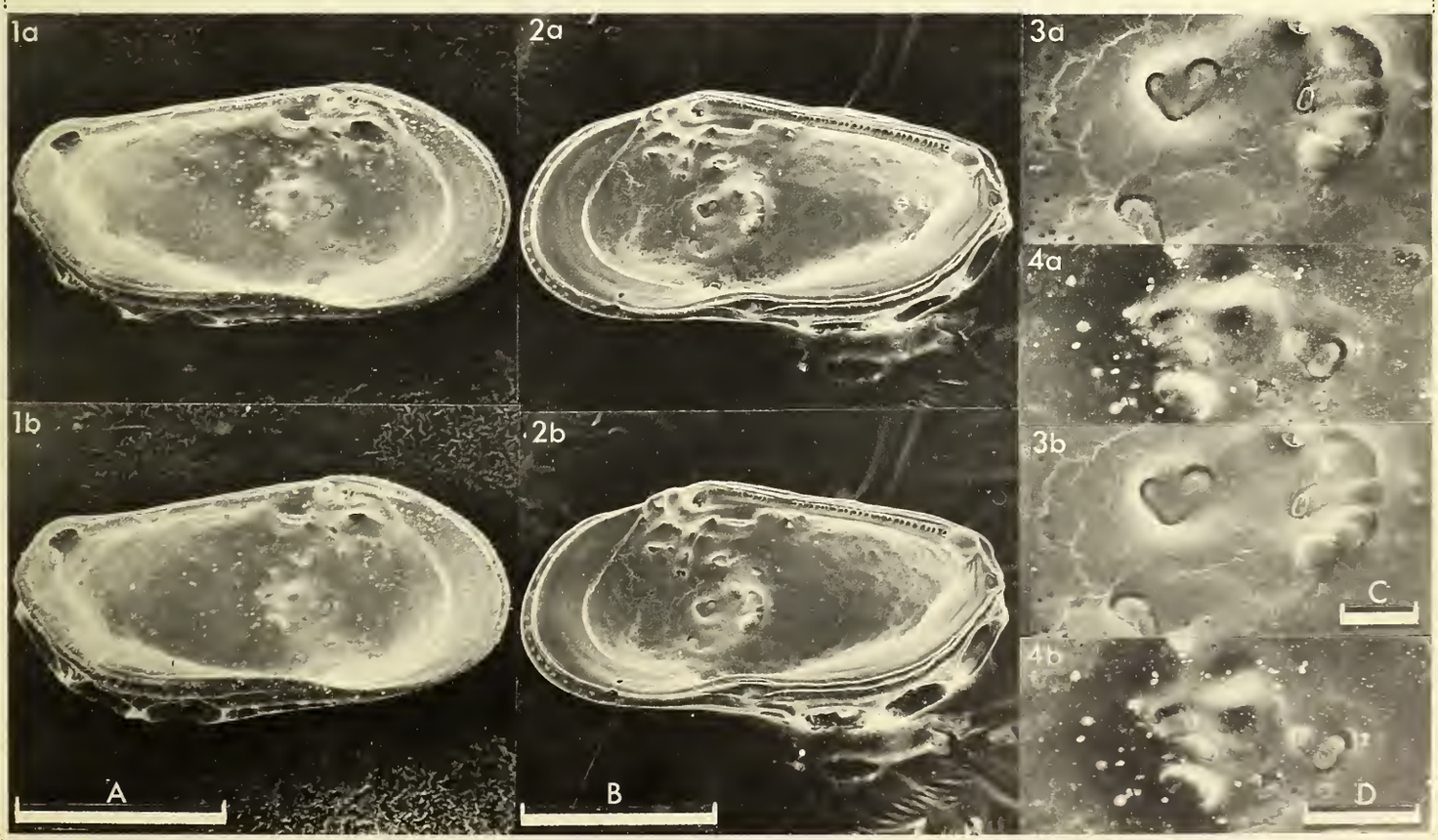
Fig. 1, ♀ LV, int.; fig. 2, ♀ RV, int.; fig. 3, RV int. musc. sc.; fig. 4, LV int. musc. sc.

Scale A (250 µm ; ×118), fig. 1; scale B (250 µm ; ×109), fig. 2; scale C (50 µm ; ×370), fig. 3; scale D (50 µm ; ×330), fig. 4.

Stereo-Atlas of Ostracod Shells, 1:43:238 *Loculicytheretta pavonia* (2 of 8)



Stereo-Atlas of Ostracod Shells, 1:43:240 *Loculicytheretta pavonia* (4 of 8)



Explanation of Plate 1:43:242

Fig. 1, ♀ RV, ext.; fig. 2, ♀ LV, ext.

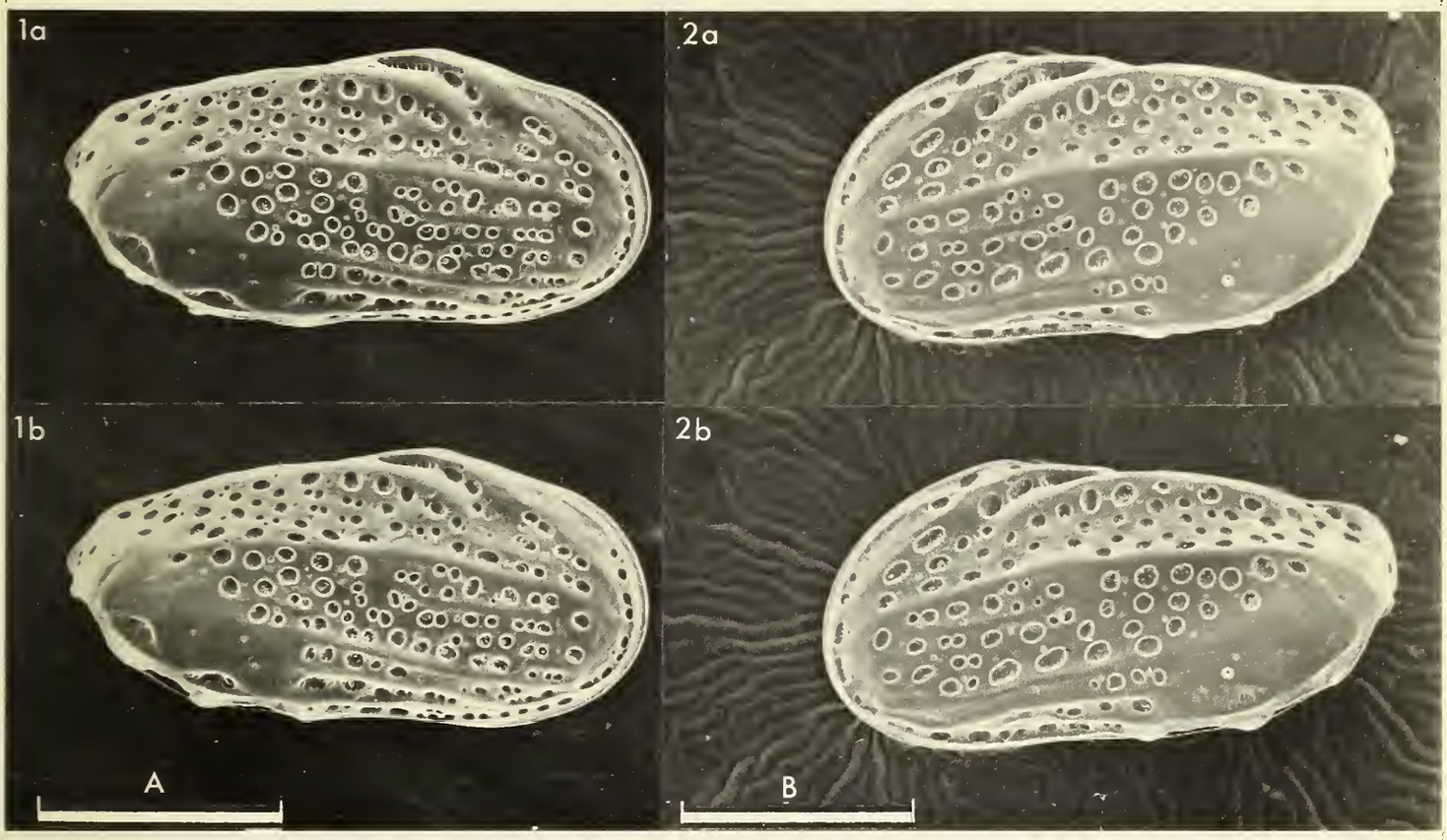
Scale A (250 µm ; ×137), fig. 1; scale B (250 µm ; ×130), fig. 2.

Explanation of Plate 1:43:244

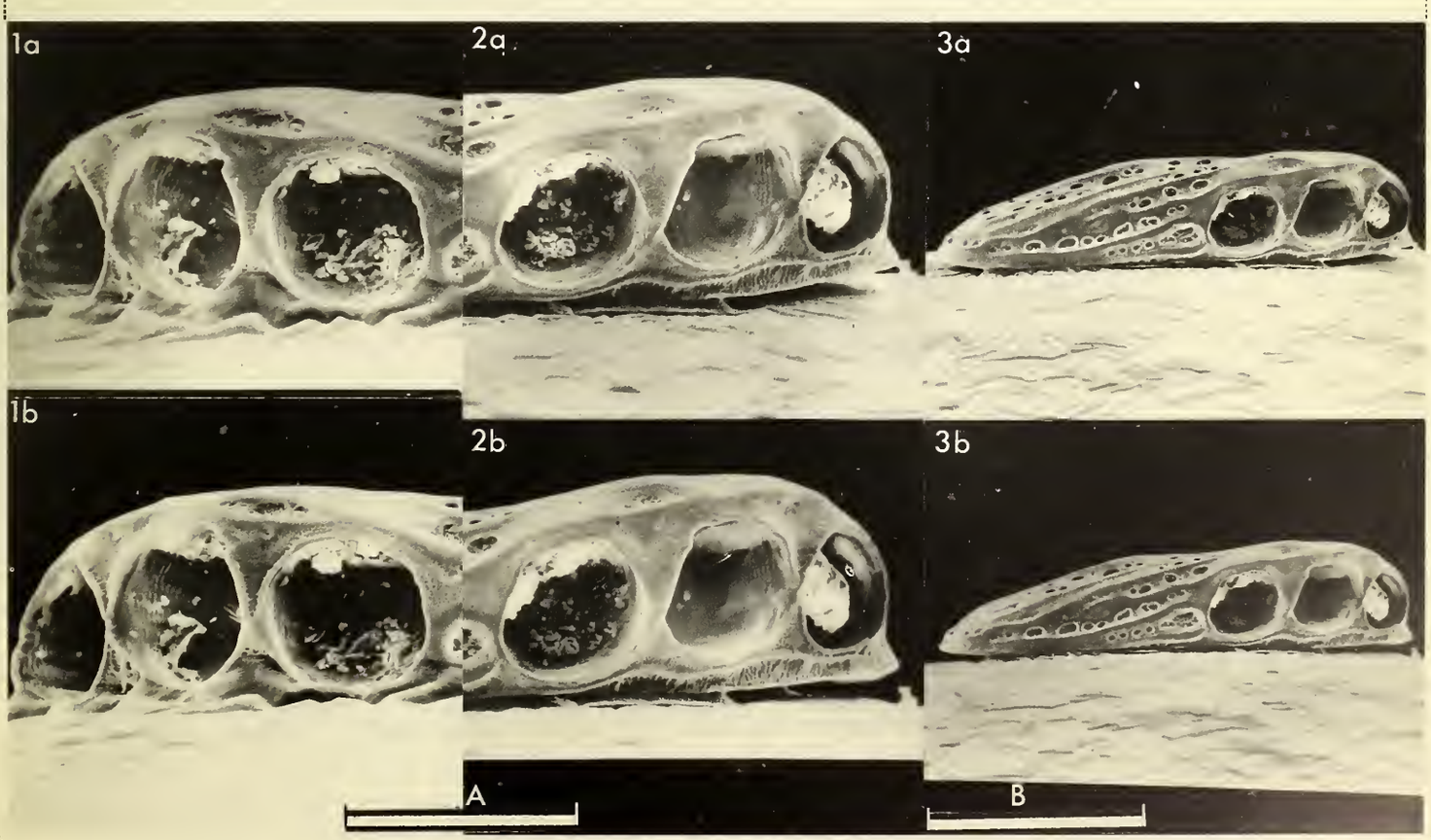
Fig. 1, ♀ RV, loculi; fig. 2, ♀ LV, loculi; fig. 3, ♀ LV, vent.

Scale A (100 µm ; ×325), figs. 1, 2; scale B (250 µm ; ×110), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:43:242 *Loculicytheretta pavonia* (6 of 8)



Stereo-Atlas of Ostracod Shells, 1:43:244 *Loculicytheretta pavonia* (8 of 8)



595.337.14 (119.3 + 118.22 + 119.1) (458.1:161.013.38 + 262.2:161.035.36): 551.351

ON *COSTA EDWARDSII* (ROEMER)

by Neriman Doruk
(University of Leicester, England)

Genus *COSTA* Neviani, 1928

Type-species (original designation): *Cytherina edwardsii* Roemer, 1838.

Costa edwardsii (Roemer, 1838)

Cytherina edwardsii F. A. Roemer, *Neues Jb. Miner. Geol. Pet.*, p. 518, pl. 6, fig. 27 (1838).
Trachyleberis edwardsii (Roemer) & *Trachyleberis edwardsii padana* G. Ruggieri; G. Ruggieri, *G. Geol.*, ser. 2, vol. 21, p. 15, text-figs. 4-6 (1950).
Costa edwardsii edwardsii (Roemer) & *Costa edwardsii runcinata* (Baird); G. Ruggieri, *Boll. Soc. paleont. ital.*, vol. 1, no. 2, p. 3, text-figs. 1, 2a, b, pl. 8, figs. 1-6 (1961).

Neotype: OCR no. 1139, RV; proposed by Ruggieri 1961, p. 4. Istituto di Geologia e Paleontologia, University of Palermo. (I am very much indebted to Prof. G. Ruggieri for loaning the type specimen).

Type locality: Cosenza, near Palermo, Sicily; approx. long. 13°23'E, lat. 38°03'N. Sicilian (Lower Quaternary).

Explanation of Plate 1:44:246

Fig. 1, ♂ RV, ext.; fig. 2, ♀ LV, ext.

Scale A (250 µm ; ×94), fig. 1; scale B (250 µm ; ×116), fig. 2.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 5229 (LV: Pl. 1:44:246, fig. 2), IO 5230 (LV: Pl. 1:44:248, figs. 1, 3), IO 5231 (RV: Pl. 1:44:248, fig. 2). The specimen figured in Pl. 1:44:246, fig. 1 is the neotype. IO 5229 from drillings off S coast of Turkey, approx. 130 m below the sea floor; Plio-Pleistocene; presumed shallow marine; approx. long. 35°59'E, lat. 36°37'N. IO 5230 and IO 5231 from drillings off S coast of Turkey, 200 m below the surface; Plio-Pleistocene; shallow marine; approx. long. 35°45'E, lat. 36°28'N.

Diagnosis: Reticulate, relatively large and rounded fossae.

Remarks: Ruggieri (1962) has distinguished two subspecies *C. e. edwardsii* and *C. e. runcinata* on the basis of some differences in the strength of ornament. I have found that variation in the strength of costae, and the whole reticulum (including the size and shape of fossae) is continuous throughout the material ranging from Tortonian to Recent and have been unable to establish the validity of subspecific differentiation. Sexual dimorphism: males more elongate (see Pl. 1:44:246, figs. 1, 2).

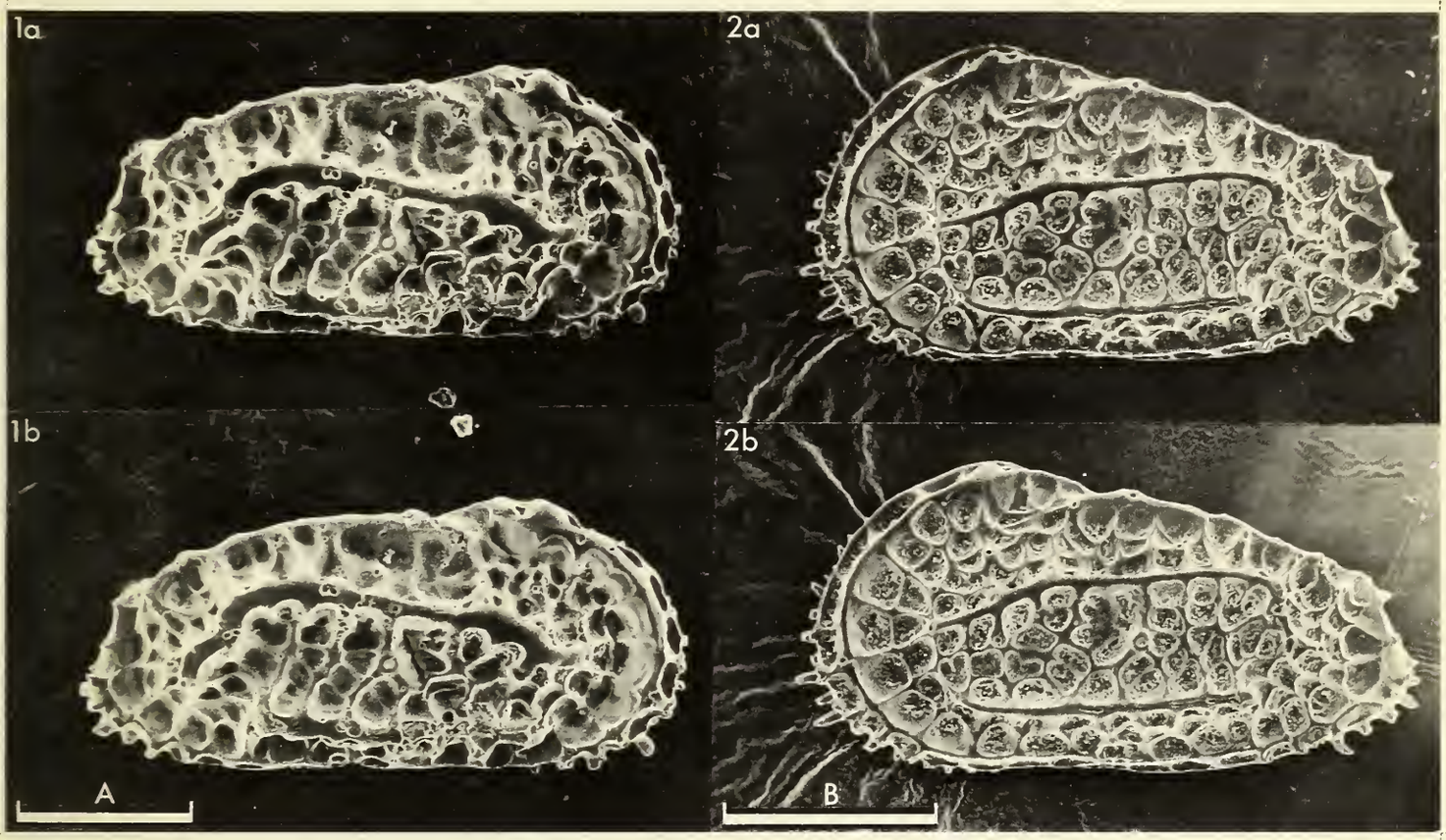
Distribution: A common species of the E Mediterranean; ranges from Upper Tortonian to Recent. Reported from Italy, Adriatic, S Aegean Islands, Aegean Sea and from Turkey.

Explanation of Plate 1:44:248

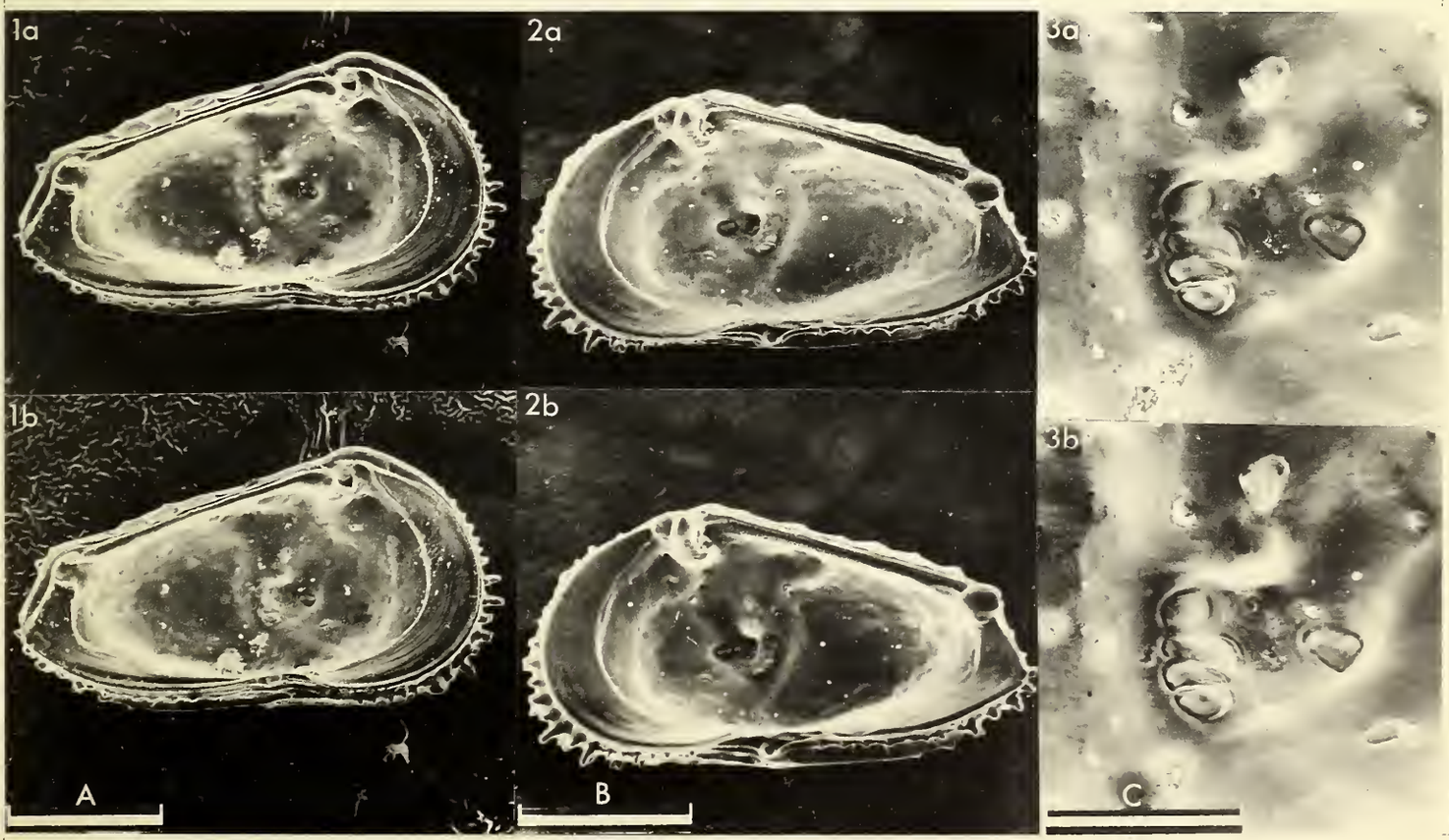
Fig. 1, ♀ LV, int.; fig. 2, ♀ RV, int.; fig. 3, LV int. musc. sc.

Scale A (250 µm ; ×86), fig. 1; scale B (250 µm ; ×94), fig. 2; scale C (100 µm ; ×266), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:44:246 *Costa edwardsii* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:44:248 *Costa edwardsii* (4 of 4)



595.337.14 (118.22 + 119.9) (560:161.035.37 + 457.8:161.017.39): 551.351

ON *COSTA BATEI* (BRADY)

by Neriman Doruk
(University of Leicester, England)

Costa batei (Brady, 1866)

Cythere batei G. S. Brady, *Trans. zool. Soc. Lond.*, vol. 5, p. 384, pl. 40, fig. 8 (1866).
Cythereis hamata G. W. Müller, *Zool. Jber. Neapel*, no. 21, p. 373, pl. 29, fig. 19; pl. 31, figs. 14-16 (1894).
Rectotrachyleberis hamata (Müller); G. Ruggieri, *G. Geol.*, ser. 2, vol. 22, p. 96 (1952).
Cythereis batei (Brady); G. Ruggieri, *G. Geol.*, ser. 2, vol. 23, p. 67, pl. 1, figs. 4, 4a, (1953).
Costa batei batei (Brady) & *Costa batei simulans* G. Ruggieri; G. Ruggieri, *Boll. Soc. paleont. ital.*, vol. 1, no. 2, p. 4, pl. 8, figs. 8, 9 (1961).
Costa batei (Brady), *Costa* aff. *batei* & *Costa* aff. *batei* (variation I); P. J. Barbeito-Gonzalez, *Mitt. hamb. zool. Mus. Inst.*, vol. 67, p. 284, pl. 16, figs. 1c, 2c, 3c, 4c; pl. 47, figs. 19-26 (1971).

Holotype: Not found (see W. Sissingh in *The Ostracodologist*, no. 19, p. 5, 1972).

Type locality: Levant, sponge sand. Recent.

Explanation of Plate 1:45:250

Fig. 1, ♀ RV, ext.; fig. 2, ♀ LV, ext.

Scale A (250 µm ; ×126), fig. 1; scale B (250 µm ; ×102), fig. 2.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 5226 (RV: Pl. 1:45:250, fig. 1), IO 5227 (LV: Pl. 1:45:250, fig. 2; Pl. 1:45:252, figs. 1, 3), IO 5228 (RV: Pl. 1:45:252, fig. 2). IO 5226 and IO 5228 both from a stream cutting 200 m E of Kılıglı, Adana, Turkey; Pliocene, yellow sandstone with abundant mollusca and foraminifera; presumed littoral; approx. long. 35°28'E, lat. 37°08'N. IO 5227 from Crotone, Italy; coll. by G. Ruggieri; Recent; approx. long. 17°08'E, lat. 39°05'N.

Diagnosis: Distinguished by sharp posterior bend of median undercut carina and by the lack of surface reticulation.

Remarks: *Cythereis hamata* is the type-species of the genus *Rectotrachyleberis* Ruggieri, 1952; Ruggieri subsequently regarded the genus as a synonym of *Costa*, but Van Morkhoven (*Post-Palaeozoic Ostracoda*, 1963) claimed a subgeneric distinction; as the degree of reticulation is variable even within species, I prefer to follow Ruggieri in regarding the two genera as synonyms. Sexual dimorphism: males more elongate.

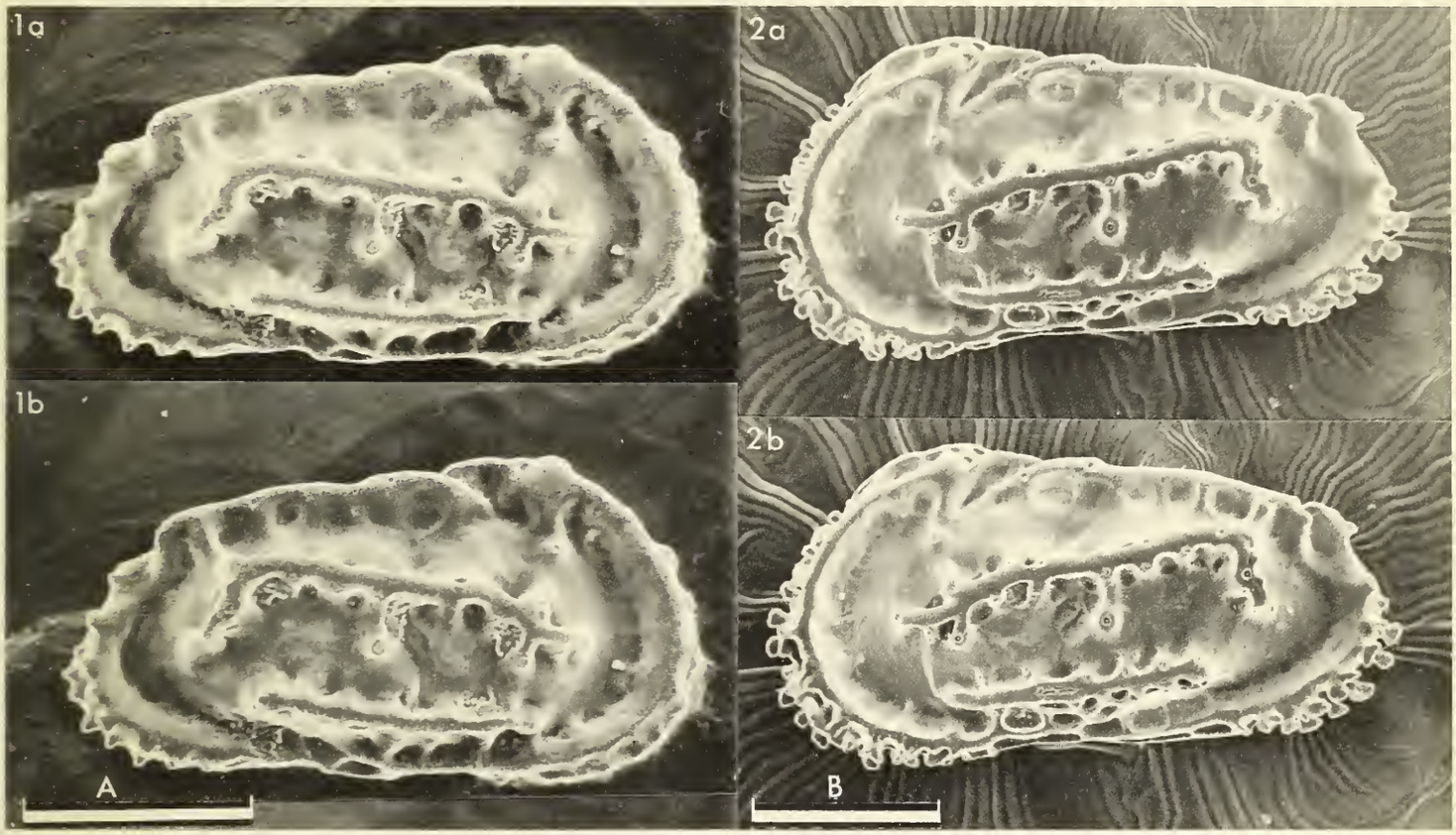
Distribution: Known widely from Miocene to Recent in the E Mediterranean; found also in Monaco (Recent). Upper Miocene (Tortonian), Pliocene, Quaternary and Recent in Turkey. The earlier (Miocene and Pliocene) forms are smaller by about 10% than later forms.

Explanation of Plate 1:45:252

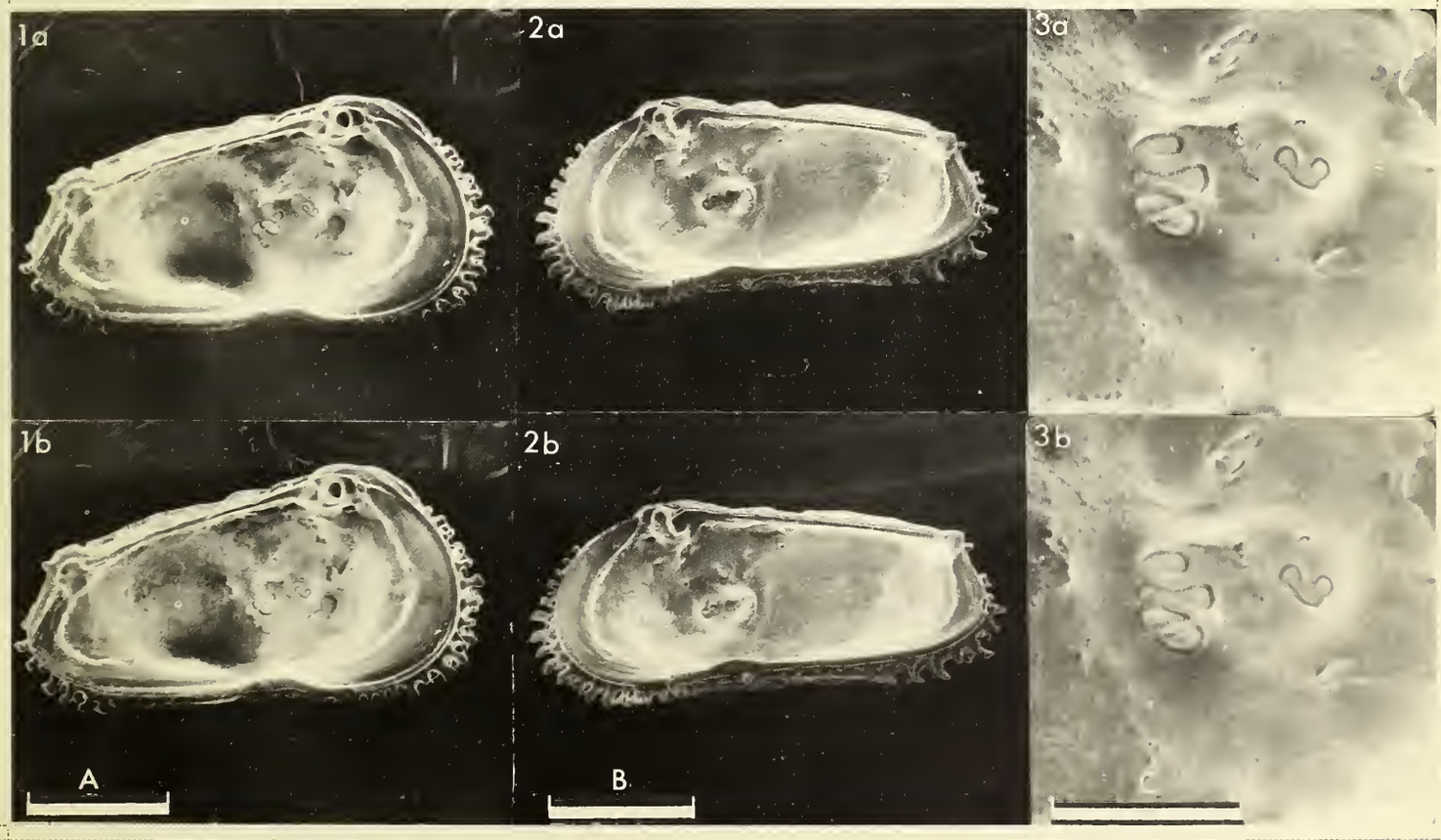
Fig. 1, ♀ LV, int.; fig. 2, ♂ RV, int.; fig. 3, LV int. musc. sc.

Scale A (250 µm ; ×80), fig. 1; scale B (250 µm ; ×83), fig. 2; scale C (100 µm ; ×264), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:45:250 *Costa batei* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:45:252 *Costa batei* (4 of 4)



595.337.14 (118.22 + 119.1) (262.2:161.035.36 + 454.3:161.012.44 + 560:161.036.36): 551.351

ON *COSTA PUNCTATISSIMA* RUGGIERI

by Neriman Doruk
(University of Leicester, England)

Costa punctatissima Ruggieri, 1962

Costa punctatissima & *Costa* sp. cf. *punctatissima* G. Ruggieri, *Boll. Soc. paleont. ital.*, vol. 1, no. 2, p. 7, pl. 8, figs. 10-12, 14 (1962).
Costa punctatissima samiensis F. Uliczny, *Hemicytheridae und Trachyleberididae aus dem Pliozän der Insel Kephallinia*, Dissertation, Univ. Munich, p. 89, pl. 7, fig. 4; pl. 17, fig. 1 (1969).

Holotype: OCR no. 1109, ♂ RV. Istituto di Geologia e Paleontologia, University of Palermo, Sicily.

Type locality: Castellarquata, Italy. Approx. long. 09°52'E, lat. 44°51'N. Upper Pliocene.

Explanation of Plate 1:46:254

Fig. 1, juv RV, ext.; fig. 2, ♂ LV, ext.

Scale A (250 µm ; ×115), fig. 1; scale B (250 µm ; ×103), fig. 2.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 5617 (RV: Pl. 1:46:254, fig. 1), IO 5618 (LV: Pl. 1:46:254, fig. 2; Pl. 1:46:256, figs. 1, 3), IO 5619 (RV: Pl. 1:46:256, fig. 2). IO 5617 from drillings off Iskenderun Bay, Turkey, approx. 200 m from the surface; Plio-Pliocene; presumed shallow marine; approx. long. 35°59'E, lat. 36°37'N. IO 5618 from Capocolle near Forli, Italy; coll. by G. Ruggieri; Upper Pliocene; approx. long. 12°02'E, lat. 44°13'N. IO 5619 from a road cutting 2-3 km NE of Samandag, Turkey; Pliocene, grey clay with molluscan shells; presumed littoral; approx. long. 36°01'E, lat. 36°07'N.

Diagnosis: Entire surface reticulate; fossae between dorsal, median and ventral costae are subdivided.

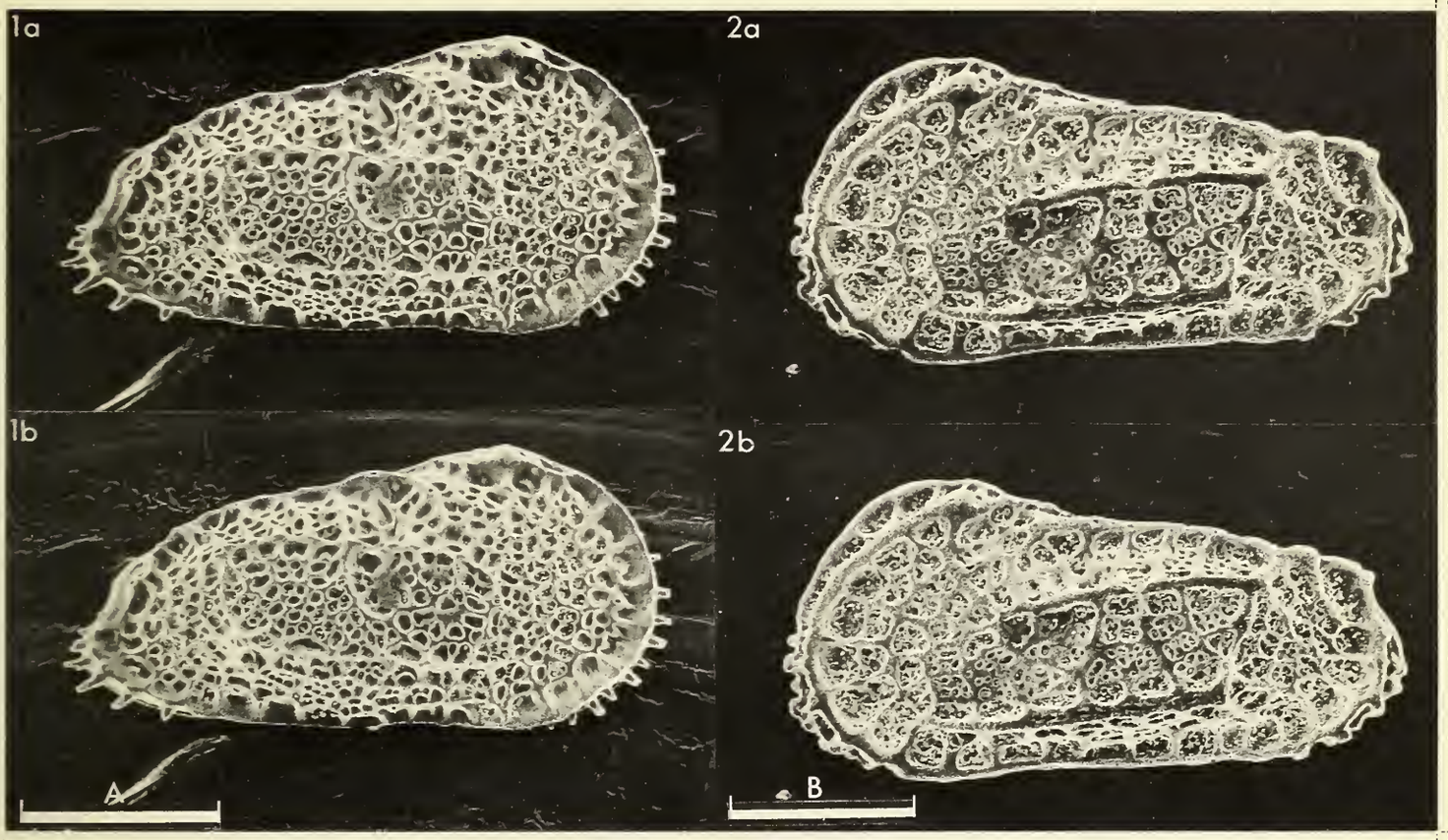
Remarks: Sexual dimorphism: males more elongate. Distribution: Pliocene and Quaternary of Italy, Greece and Crete (Ruggieri 1962, Uliczny 1969, Sissingh, *Bull. Micropaleontol. Utrecht*, 1972), and Pliocene, Pleistocene of Turkey and Cyprus.

Explanation of Plate 1:46:256

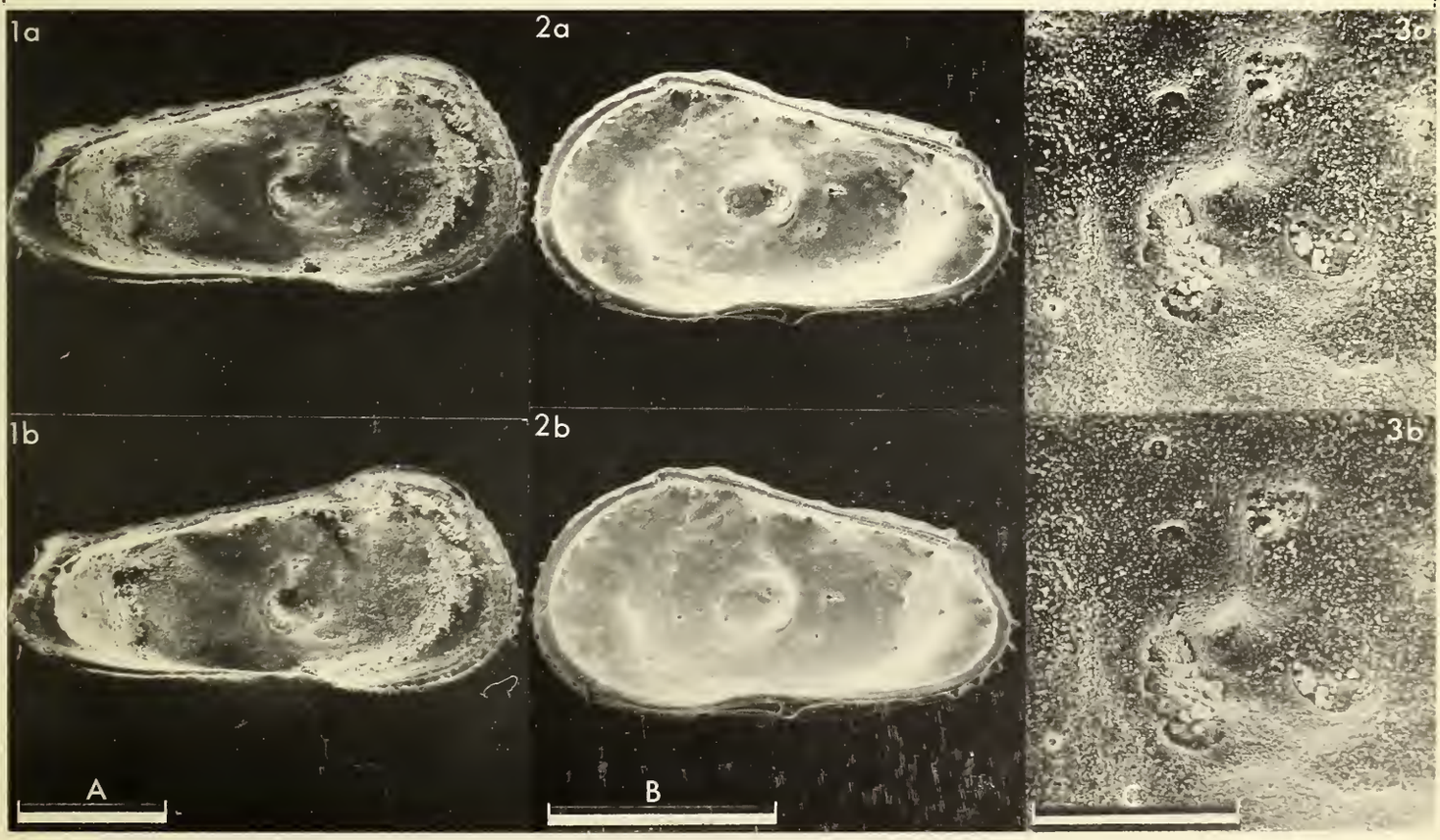
Fig. 1, ♂ LV, int.; fig. 2, juv RV, int.; fig. 3, LV int. musc. sc.

Scale A (250 µm ; ×83), fig. 1; scale B (250 µm ; ×149), fig. 2; scale C (100 µm ; ×273), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:46:254 *Costa punctatissima* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:46:256 *Costa punctatissima* (4 of 4)



595.337.14 (116.222) (423.8:162.003.51): 551.35 + 552.52

ON *TRACHYCYTHERE MUNITA* SYLVESTER-BRADLEY sp. nov.

by P. C. Sylvester-Bradley
(University of Leicester, England)

Trachycythere munita sp. nov.

Trachycythere sp. nov. R. H. Bate, *Bull. Br. Mus. nat. Hist. (Geol.)*, vol. 17, p. 428, pl. 16, fig. 3 (1969).

Holotype: Brit. Mus. (Nat. Hist.) IN 49021 (♂ RV).

Type locality: Middle Jurassic (Upper Bathonian: *Prohecticoceras retrocostatum* Zone) of Bath, England (Upper Fullers' Earth Clay, small quarry in Vernham Wood, Odd Down, 3 km S of Bath; Nat. Grid Ref.: ST 733618; long. 2°23'W, lat. 51°21'N). Author's coll., April 1947, from the "Bastard Earth", 1.5 m above top of commercial Fullers' Earth. Field ref.: 47 VW7(5).

Derivation of name: Latin "fortified", referring to fancied resemblance of tubercles to castellated towers.

Explanation of Plate 1:47:258

Figs. 1-3, ♂ RV: fig. 1, ext. lat. (specimen 450 µm long); figs. 2, 3, eye tubercle.

Scale A (100 µm ; ×200), fig. 1; scale B (100 µm ; ×400), fig. 2; scale C (25 µm ; ×800), fig. 3.

Figured specimens: Brit. Mus. (Nat. Hist.) IN 49021 (♂ RV: Pl. 1:47:258, figs. 1-3; Pl. 1:47:260, figs. 1-3; Pl. 1:47:264, fig. 2), IN 49022 (♀ LV: Pl. 1:47:262, fig. 1), IN 49023 (♂ LV: Pl. 1:47:262, figs. 2, 3; Pl. 1:47:264, fig. 1). IN 49021 from type locality. IN 49022 from the commercial Fullers' Earth Clay mined near Combe Bay, Bath (Nat. Grid Ref.: ST 729612); author's coll., April 1947, field ref. 47 FW9. IN 49023 from a temporary excavation, Horsecombe Vale, near South Stoke, Bath (Nat. Grid Ref.: ST 754616); author's coll., April 1947, field ref. 47 HVA2; Upper Fullers' Earth Clay associated with *Rhynchonelloidella smithi* (Davidson), *R. mesoloba* Muir-Wood, and *Catinula matisconensis* auct. [= *C. mendipensis* Sylvester-Bradley MS.].

Diagnosis: About 14 cylindrical turretted tubercles, each terminating in a pore. A rather greater number of lower, rimmed sieve-type normal pores. Prominent eye tubercle. Marked denticulate ventral carina. Muri of reticulation forming delicate tracery.

Remarks: Differs from *T. tubulosa* Triebel & Klingler (*Geol. Jb.*, 76, pp. 344-346, 1959) from the Middle Lias of Germany in prominence of eye tubercles and presence of ventral carina.

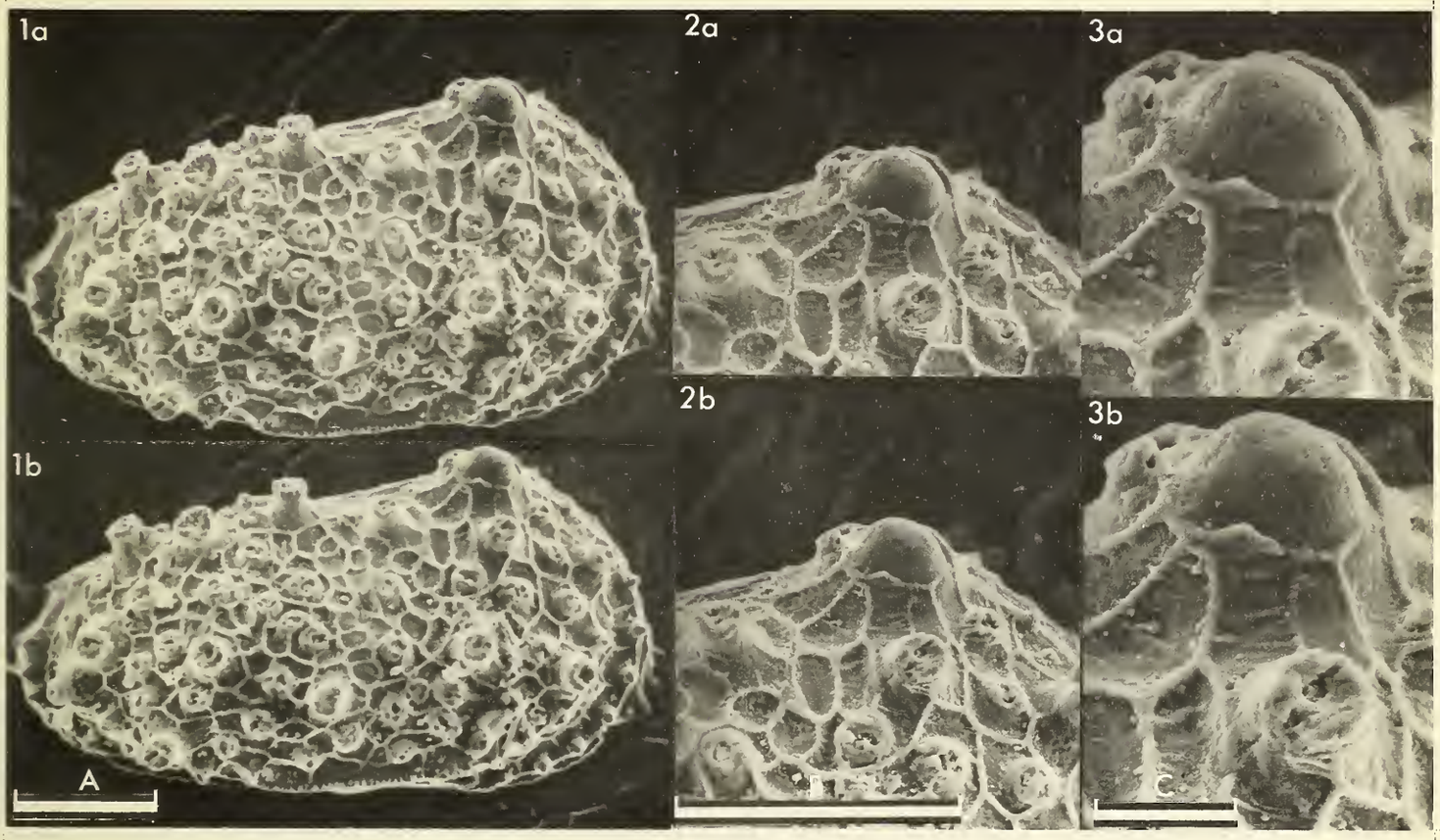
Distribution: Upper Bathonian of S England.

Explanation of Plate 1:47:260

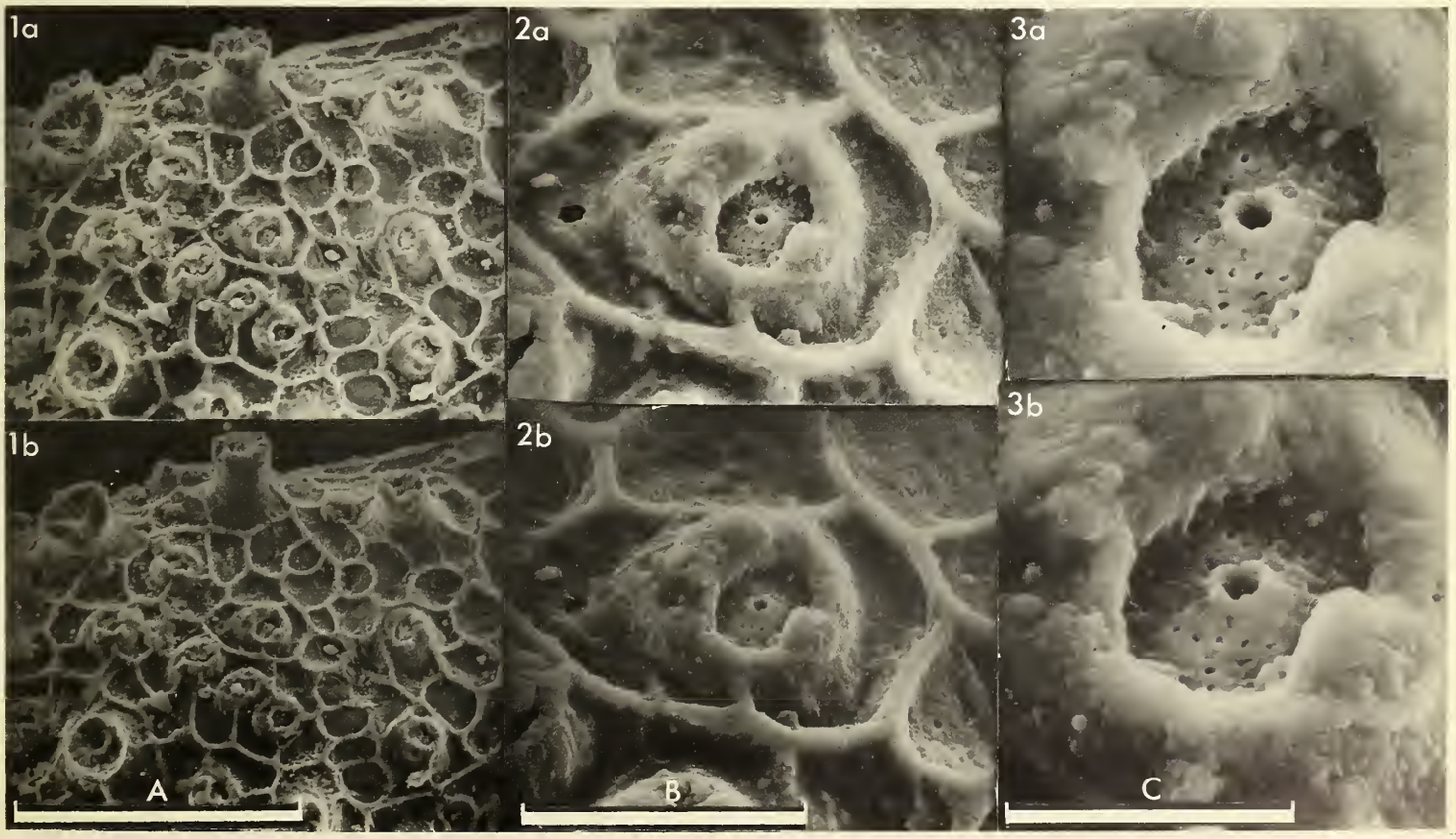
Figs. 1-3, ♂ RV: fig. 1, castellate tubercles & normal pores; figs. 2, 3, normal pore with sieve plate.

Scale A (100 µm ; ×400), fig. 1; scale B (25 µm ; ×1600), fig. 2; scale C (10 µm ; ×4000), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:47:258 *Trachycythere munita* (2 of 8)



Stereo-Atlas of Ostracod Shells, 1:47:260 *Trachycythere munita* (4 of 8)



Explanation of Plate 1:47:262

Fig. 1, ♀ LV, ext. lat. (specimen 425 µm long); fig. 2, ♂ LV, ext. lat. (specimen 450 µm long); fig. 3, castellate tubercle.

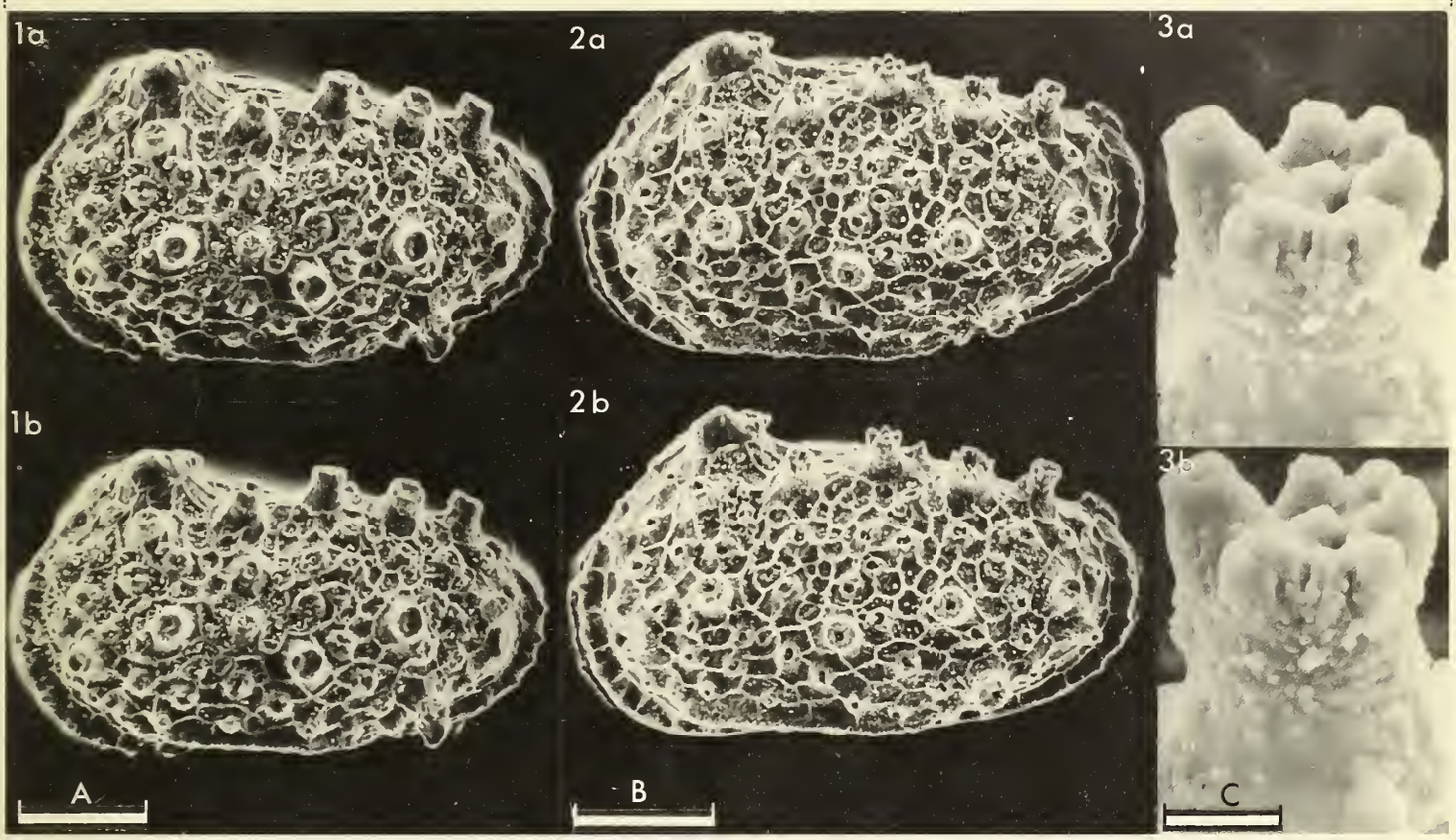
Scale A (100 µm ; ×170), fig. 1; scale B (100 µm ; ×190), fig. 2; scale C (10 µm ; ×1600), fig. 3.

Explanation of Plate 1:47:264

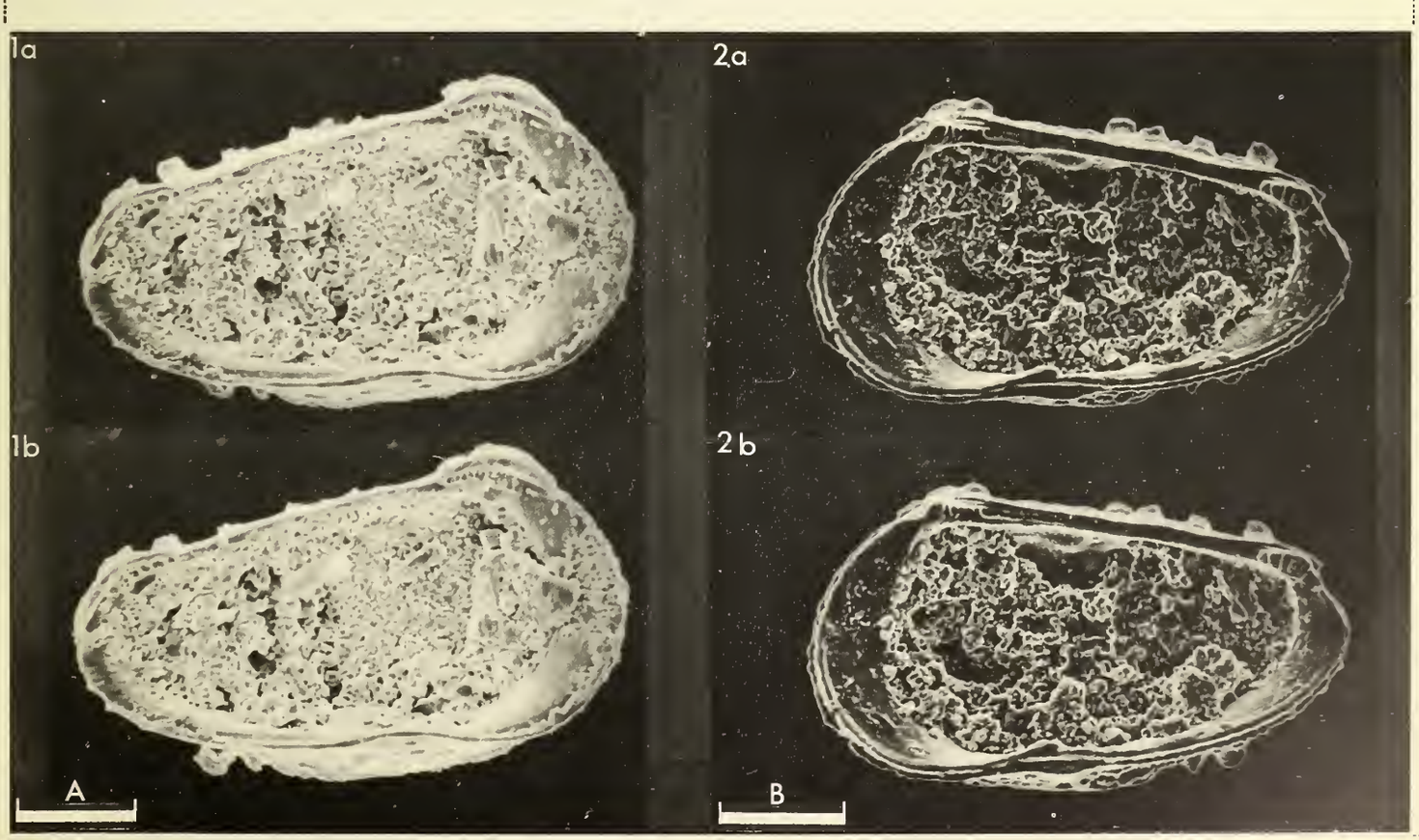
Fig. 1, ♂ LV, int. lat.; fig. 2, ♂ RV, int. lat.

Scale A (100 µm ; ×180), fig. 1; scale B (100 µm ; ×170), fig. 2.

Stereo-Atlas of Ostracod Shells, 1:47:262 *Trachycythere munita* (6 of 8)



Stereo-Atlas of Ostracod Shells, 1:47:264 *Trachycythere munita* (8 of 8)



595.337.14 (119.9) (680:163.023.35): 551.313.2

ON *SULCOSTOCYTHERE KNYSNAENSIS* BENSON AND MADDOCKS

by Richard H. Benson
(Smithsonian Institution, Washington, D.C., U.S.A.)

Genus *SULCOSTOCYTHERE* Benson and Maddocks, 1964

Type-species (original designation): *Sulcostocythere knysnaensis* Benson and Maddocks, 1964

Diagnosis: Similar to *Neomonoceratina* Kingma. Distinguished by absence of caudal process and by its tripartite, longitudinal ridge pattern of carapace augmented by anterior and posterior marginal ridges.

Remarks: A member of the tribe Paijenborchellini Deroo, 1966 (after Hanai *J. Paleont.*, vol. 44, no. 4, pp. 693-729, 1970).

Explanation of Plate 1:48:266

Fig. 1, LV ext. lat. (specimen 630 µm long); fig. 2, subcentral tubercle.

Scale A (100 µm ; ×138), fig. 1; scale B (50 µm ; ×345), fig. 2.

Sulcostocythere knysnaensis Benson and Maddocks, 1964

Sulcostocythere knysnaensis sp. nov. R. H. Benson & R. F. Maddocks, *Univ. Kans. Paleont. Contr. Arthro.*, no. 5, pp. 20, 21, pl. 3, figs. 1-12, text-figs. 9, 10 (1964).

Lectotype: U.S.N.M. coll. no. 113098, ♂ RV; Benson & Maddocks, pl. 4, fig. 2, 1964. Designated by Benson, *J. Paleont.*, vol. 40, no. 3, p. 747, 1966.

Type locality: Knysna Estuary, Republic of South Africa; Rail Bridge (sample KNY 220). Recent.

Diagnosis: "Primitive" schizodont hinge [merodont in the closely allied species *S. unispinosa* (Brady, 1868); see also Maddocks *Univ. Kans. Paleont. Contr.*, 1966, Hanai 1970]; widely distributed radial pore canals in the anterior.

Figured specimens: U.S.N.M. coll. nos. 190443 (LV: Pl. 1:48:266, figs. 1, 2) and 190442 (RV: Pl. 1:48:268, figs. 1, 2). Both paralectotypes from Rail Bridge (sample KNY 220), Knysna Estuary, Republic of South Africa; from low-water level of neap tide.

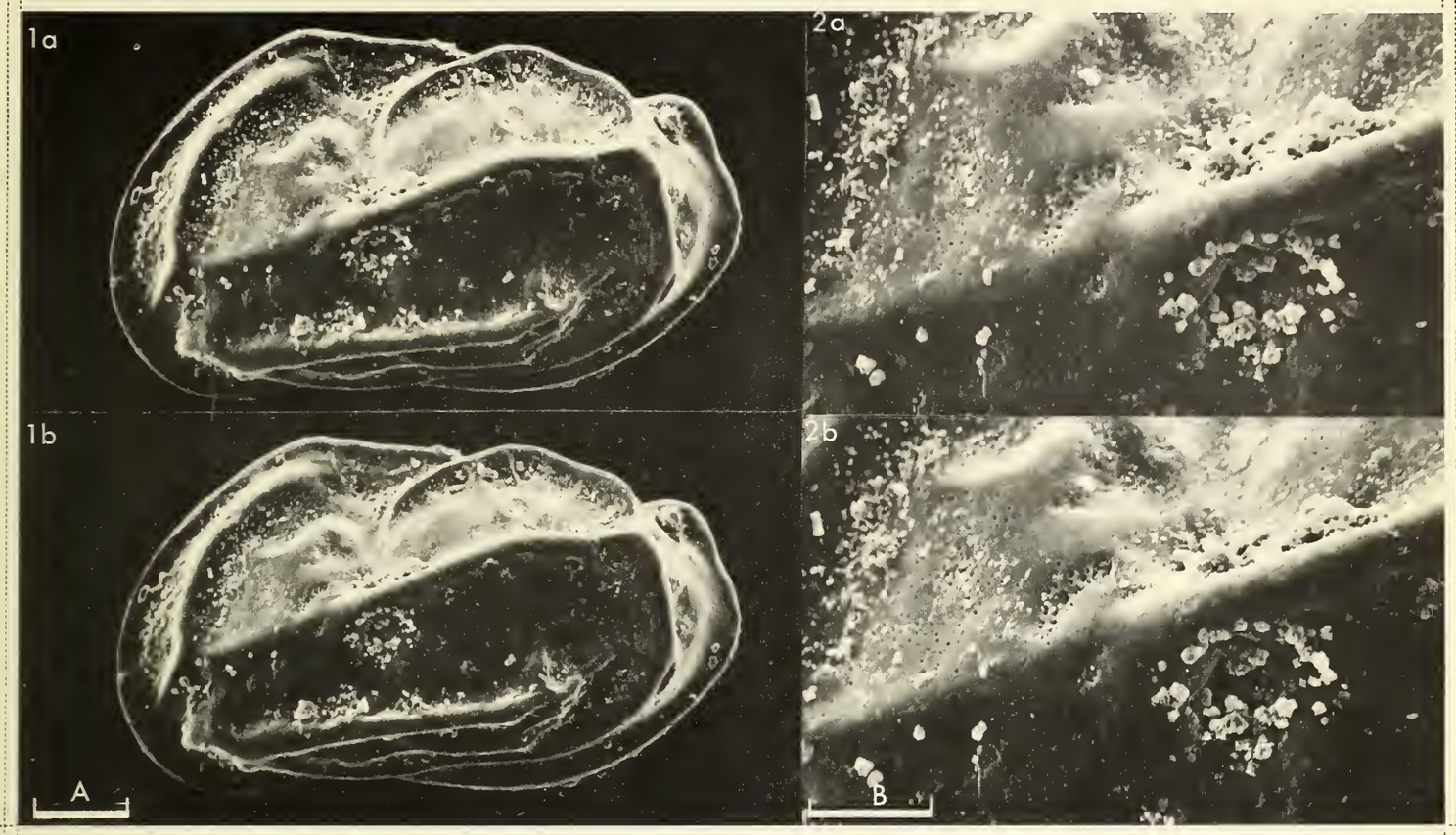
Remarks: This species is a temperate end-point of adaptive development of a littoral and marginal facies group widespread in the Indian Ocean.

Explanation of Plate 1:48:268

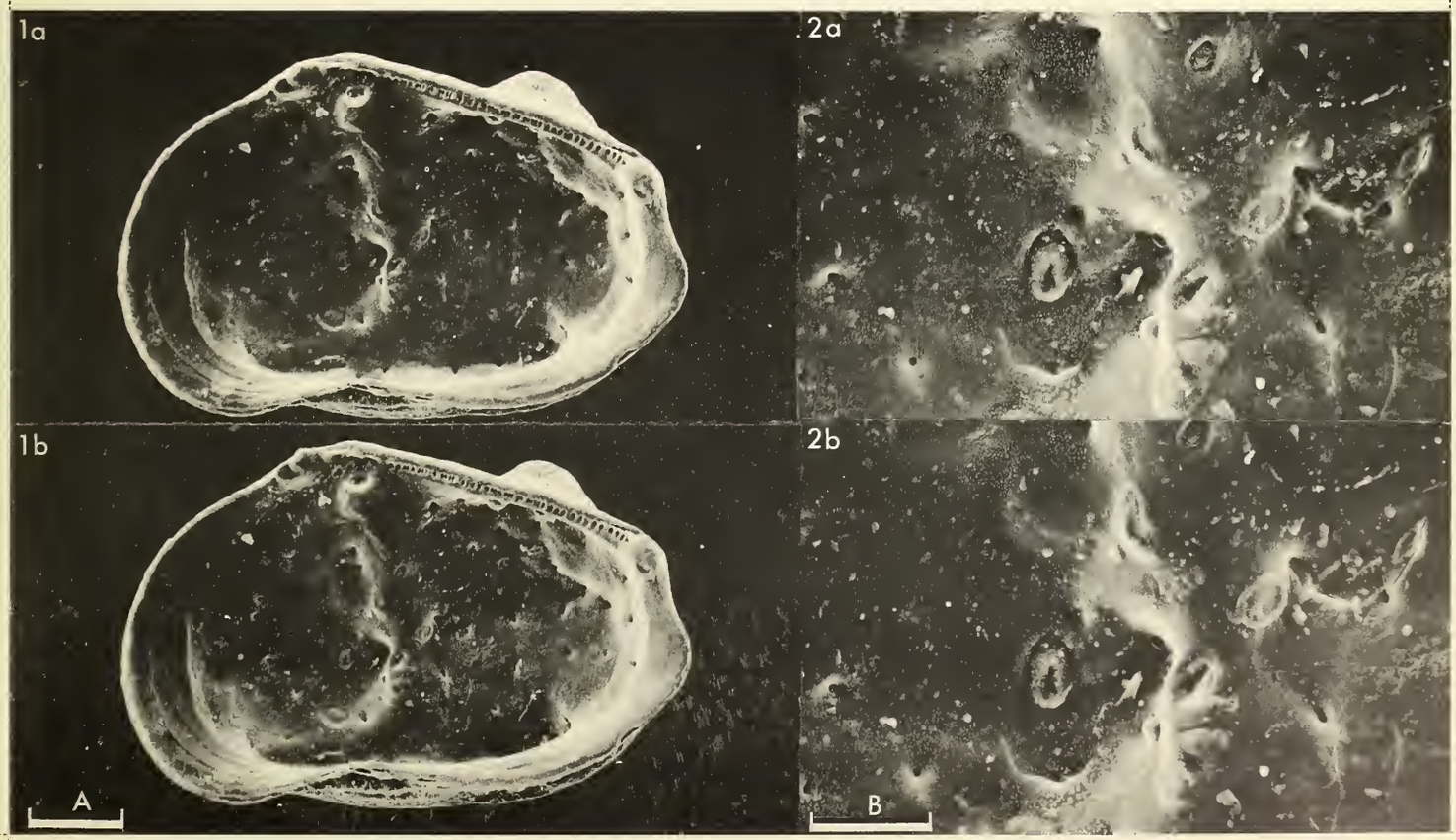
Fig. 1, RV int. lat. (specimen 600 µm long); fig. 2, RV int. musc. sc.

Scale A (100 µm ; ×130), fig. 1; scale B (50 µm ; ×335), fig. 2.

Stereo-Atlas of Ostracod Shells, 1:48:266 *Sulcostocythere knysnaensis* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:48:268 *Sulcostocythere knysnaensis* (4 of 4)



595.337.14 (119.9) (269.56:163.165.77): 551.351 (24.08.57)

ON *LOXORETICULATUM FALLAX* (G. W. MÜLLER)

by Richard H. Benson
(Smithsonian Institution, Washington, D.C., U.S.A.)

Genus *LOXORETICULATUM* Benson, 1964

Type-species (original designation): *Cytheropteron fallax* Müller, 1908

Diagnosis: Distinguished by its elongate subrectangular reticulate carapace similar to *Loxoconcha*, and its *Cytheropteron*-like, antimerodont hinge.

Explanation of Plate 1:49:270

Fig. 1, LV ext. lat. (specimen 660 µm long); fig. 2, subcentral tubercle.

Scale A (100 µm ; ×135), fig. 1; scale B (50 µm ; ×370), fig. 2.

Loxoreticulatum fallax (G. W. Müller, 1908)

Cytheropteron fallax G. W. Müller, *Wiss. Ergebn. dt. Südpolar-Exped.*, Bd. 10, Zoology, II Bd., p. 107, pl. 18, figs. 5, 6, 10, text-figs. on p. 108 (1908).
Cythere foveolata Brady; F. Chapman, *in Br. Antarct. Exped. 1907-9. Rep. Scient. Invest. Geology. Vol. II. Contr. Paleont. Petrol. South Victoria Land*, p. 38, pl. 4, fig. 2 (1916).
Loxoreticulatum fallax (Müller); R. H. Benson, *Univ. Kans. Paleont. Contr. Arthro.*, no. 6, pp. 19-21, pl. 3, figs. 1-3, 6, text-figs. 11, 12 (1964).
Loxoreticulatum fallax (Müller); J. W. Neale, *Br. Antarct. Surv. Scient. Rep.*, no. 58, pp. 20, 21, pl. 1i, j; pl. 4b, b´, c (1967).

Type specimens: Repository unknown.

Type locality: Gauss Station, approx. lat. 65°S, long. 90°E, Indian Ocean sector of the Antarctic shelf.

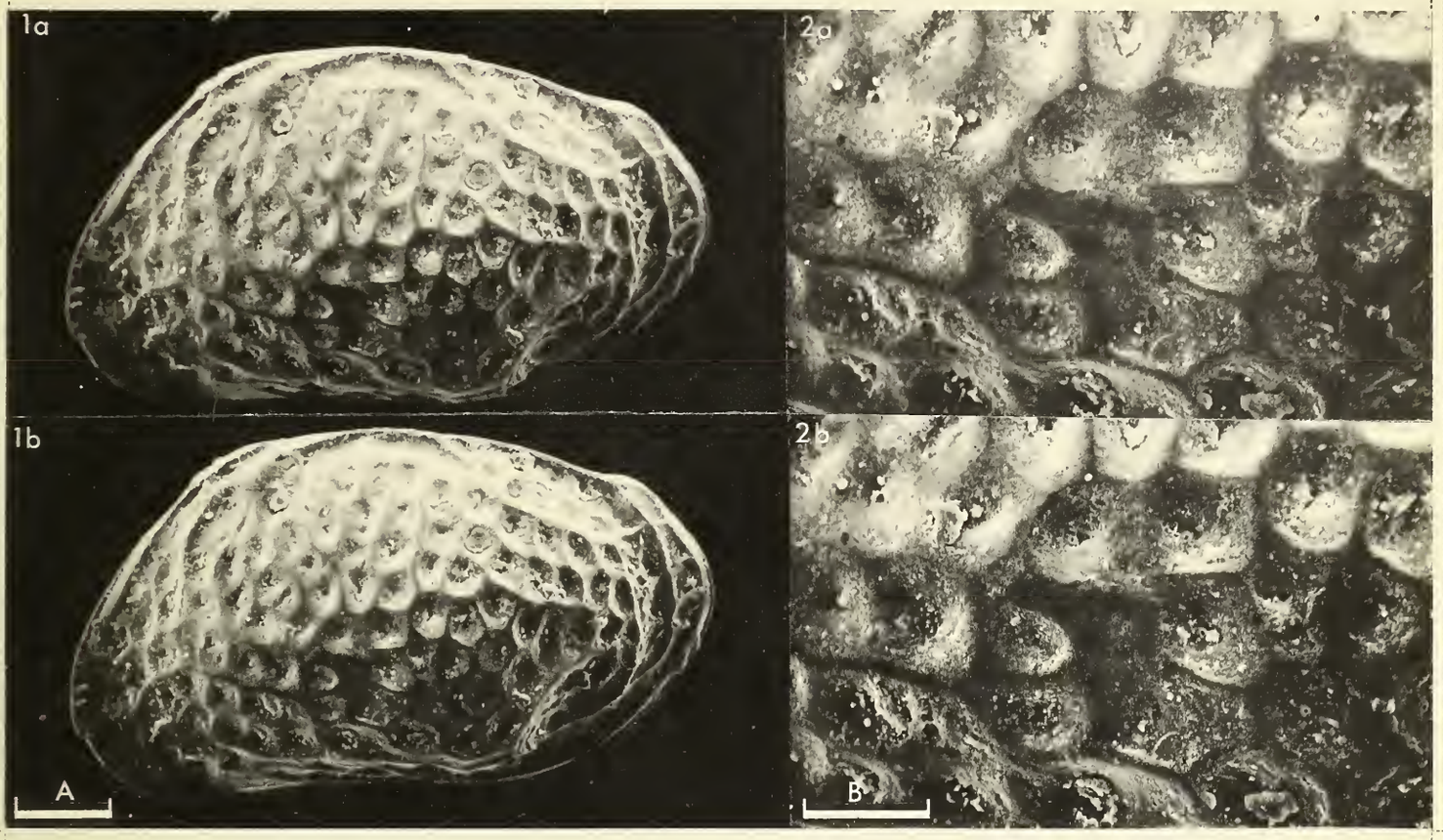
Figured specimens: U.S.N.M. coll. nos. 190444 (LV: Pl. 1:49:270, figs. 1, 2) and 190445 (RV: Pl. 1:49:272, figs. 1, 2). Both Recent from S of Hut Point at entrance to Winter Quarters Bay, McMurdo Sound, Ross Sea, Antarctica; 57 m.

Explanation of Plate 1:49:272

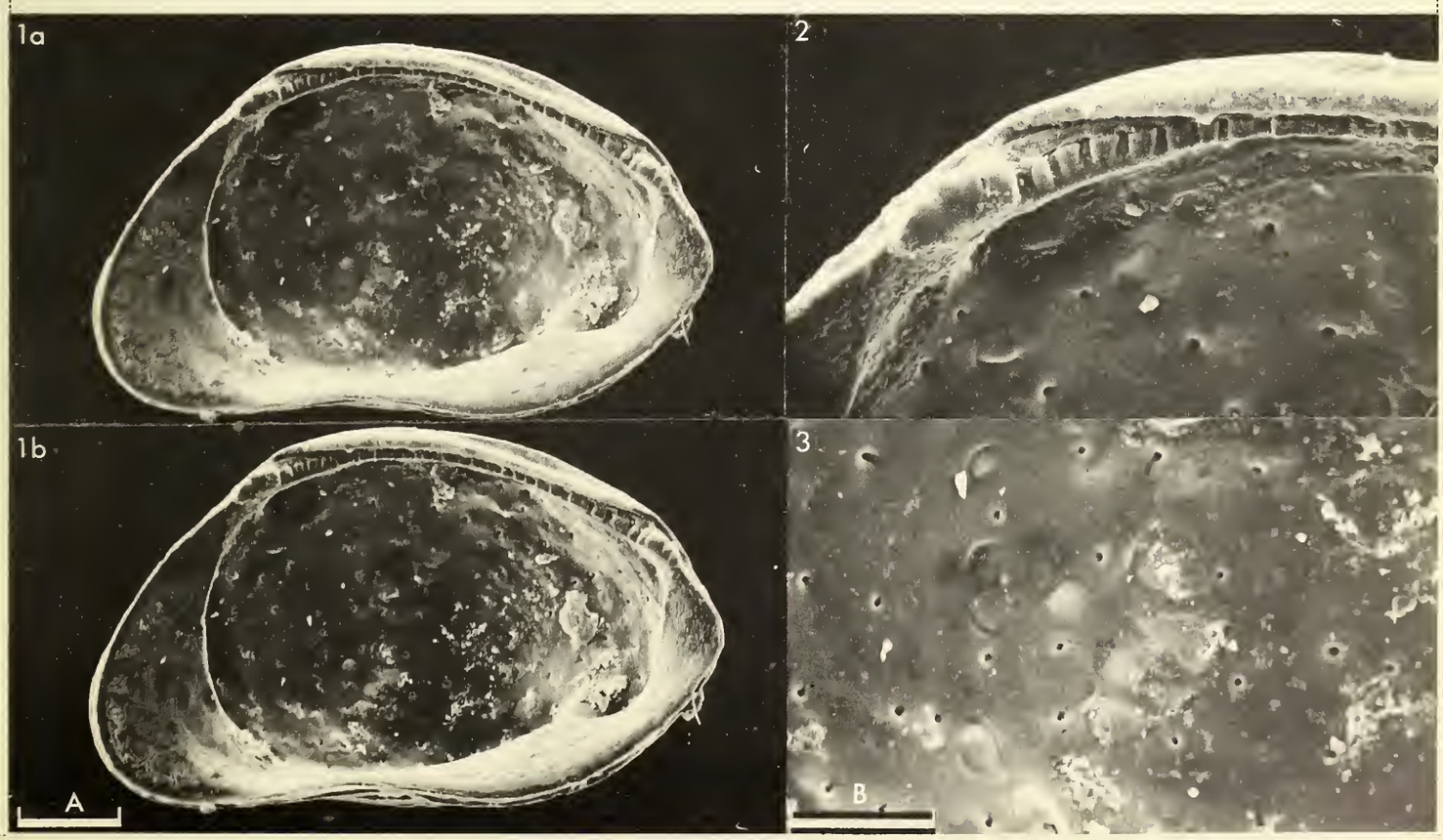
Fig. 1, RV int. lat. (specimen 610 µm long); fig. 2, RV ant. hinge; fig. 3, RV int. musc. sc.

Scale A (100 µm ; ×145), fig. 1; scale B (50 µm ; ×415), figs. 2, 3.

Stereo-Atlas of Ostracod Shells, 1:49:270 *Loxoreticulatum fallax* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:49:272 *Loxoreticulatum fallax* (4 of 4)



595.337.14 (119.9) (422.7:162.002.50 + 428.2:162.002.50): 551.313.1

ON *CYTHERURA GIBBA* (O. F. MÜLLER)

by John E. Whittaker
(British Museum (Natural History), London)

Genus *CYTHERURA* Sars, 1866

Type-species (designated by Sars, 1866): *Cythere gibba* O. F. Müller, 1785

Remarks: Many species formerly referred to *Cytherura* now belong to other genera within the Cytheruridae such as *Semicytherura* and *Hemicytherura*. I am not in a position to comment on the Mesozoic and Tertiary forms that have been placed in this genus, but as far as I am aware no Recent species apart from *C. gibba* is congeneric.

Explanation of Plate 1:50:274

Fig. 1, ♀ car., ext. rt. lat.; fig. 2, ♂ car., ext. rt. lat.

Scale A (100 µm ; ×170), figs. 1, 2.

Cytherura gibba (O. F. Müller, 1785)

Cythere gibba sp. nov. O. F. Müller, *Entomostraca seu Insecta Testacea, quae in aquis Daniae et Norvegiae reperit, descripsit et iconibus illustravit*, Lipsiae et Havniae, p. 66, pl. VII, figs. 7-9 (1785) [♀].

Cythere gibbera sp. nov. O. F. Müller, *ibid.*, p. 66, pl. VII, figs. 10-12 (1785) [♂].

Cytherura gibba (O. F. Müller); G. O. Sars, *Forh. VidenskSelks. Krist.*, vol. for 1865, p. 70, (1866) [♀ & ♂].

Cytherura robertsoni sp. nov. G. S. Brady, *Trans. Linn. Soc. Lond.*, vol. 26, pt. 2, p. 444, pl. XXXII, figs. 16-18 (1868) [♀].

[*non Cytherura gibba* (O. F. Müller); G. S. Brady, *ibid.*, p. 444, pl. XXXII, figs. 68-70 (1868) = ♂ of *Cytherura cornuta* Brady, 1868].

[*non Cytherura gibba* (O. F. Müller); G. S. Brady, W. H. Crosskey & D. Robertson, *Paleontogr. Soc. (Monogr.)*, vol. for 1874, p. 198, pl. XIII, figs. 26-29 (1874) = ♂ of *C. cornuta* Brady, 1868].

Cytherura gibba (O. F. Müller); G. O. Sars, *An account of the Crustacea of Norway*, vol. 9, *Ostracoda*, Bergen Museum, pts. 11, 12, p. 200, pl. XCIII (1925) [♀ & ♂].

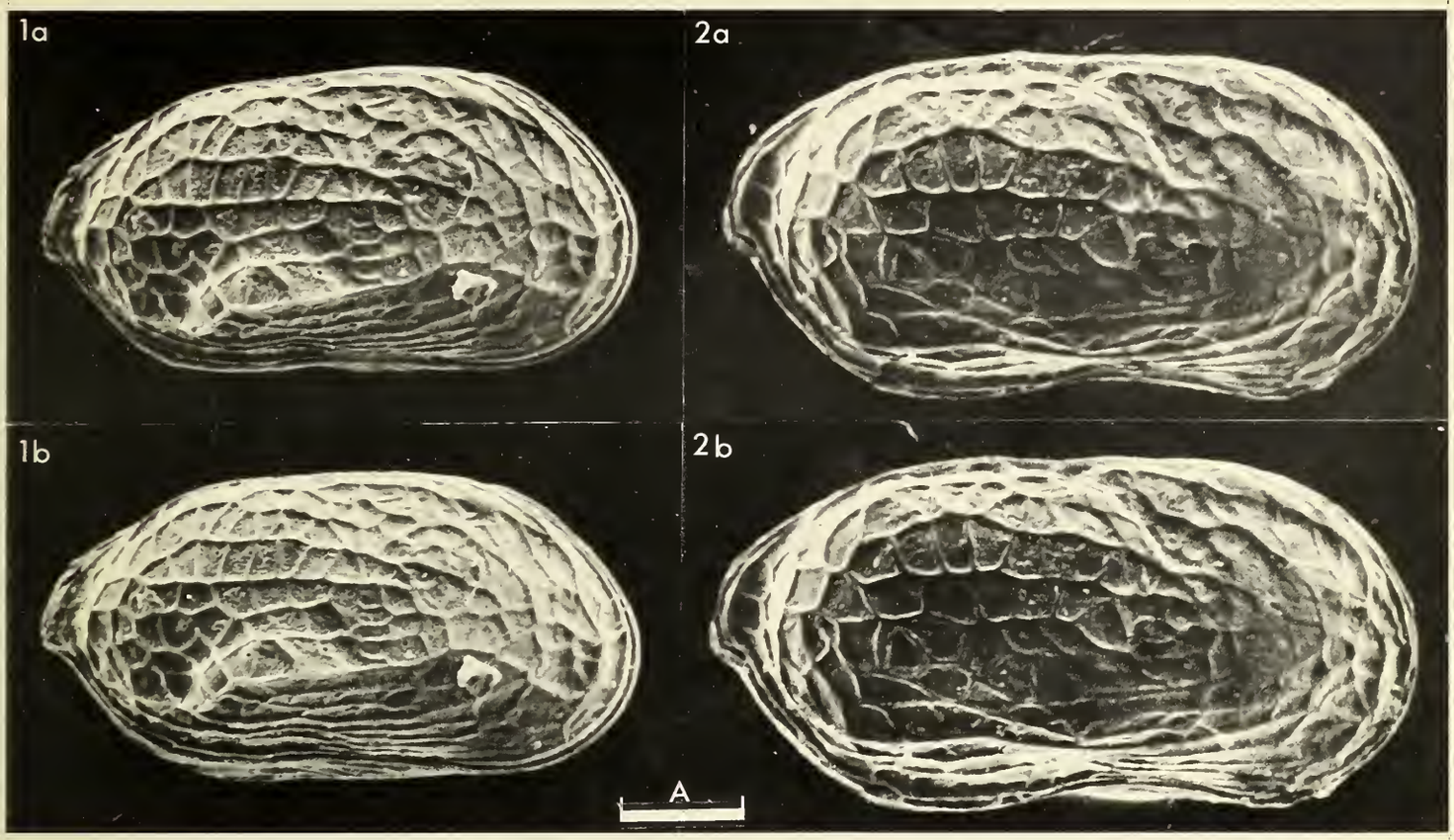
Type specimens: The whereabouts of Müller's original material is not known and must be presumed lost.

Explanation of Plate 1:50:276

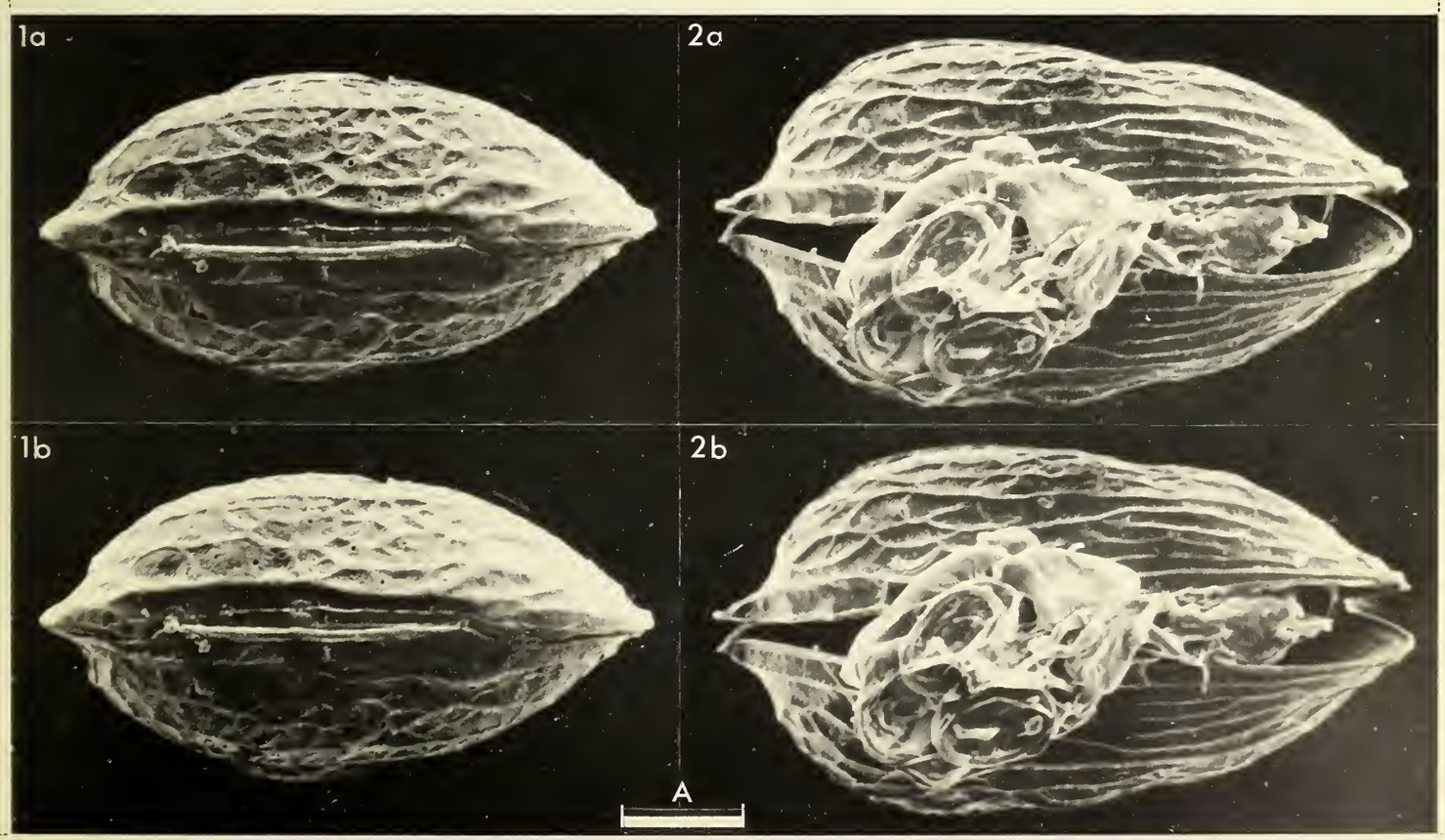
Fig. 1, ♀ car., ext. dors.; fig. 2, ♂ car., ext. vent. showing projecting copulatory appendage.

Scale A (100 µm ; ×170), figs. 1, 2.

Stereo-Atlas of Ostracod Shells, 1:50:274 *Cytherura gibba* (2 of 8)



Stereo-Atlas of Ostracod Shells, 1:50:276 *Cytherura gibba* (4 of 8)



Figured specimens: Brit. Mus. (Nat. Hist.) nos. 1973.853 (♀ car.: Pl. 1:50:274, fig. 1), 1973.854 (♀ car.: Pl. 1:50:280, fig. 2), 1973.855 (♀ car.: Pl. 1:50:276, fig. 1), 1973.856 (♂ car.: Pl. 1:50:274, fig. 2; Pl. 1:50:280, fig. 3), 1973.857 (juv-1 car.: Pl. 1:50:280, fig. 1), 1973.858 (♂ car.: Pl. 1:50:276, fig. 2), 1973.859 (♂ LV: Pl. 1:50:278, fig. 1), 1973.860 (♂ RV: Pl. 1:50:278, fig. 2), 1973.861 (♀ RV: Pl. 1:50:278, fig. 3), 1973.862 (♂ RV: Pl. 1:50:278, fig. 4). Recent. Nos. 1973.853-857 from Christchurch Harbour, S England (approx. long. 1°45'W, lat. 50°43'N), coll. by Dr. J. W. Murray, Univ. of Bristol, in 1958/59, to whom thanks are due for the donation of the material; nos. 1973.858-862 from Seaton Sluice, Northumberland, NE England (approx. long. 1°29'W, lat. 55°05'N), taken from a slide (no. 1911.11.8. M3588) in the Norman Collection of the Brit. Mus. (Nat. Hist.). The latter specimens were living at the time of collection in 1872.

Diagnosis: Posterior extremity of carapace drawn out into a weak caudal process just above mid-height. Females and juveniles with a distinct lateral backward-projecting protuberance in the lower half of each valve. Sexual dimorphism strong, the males being more elongate but thinner. Ornamentation reticulate. Internally, inner lamella narrow throughout; line of concrescence runs subparallel to outer margin.

Explanation of Plate 1:50:278

Fig. 1, ♂ LV, int. lat., ant. hinge; fig. 2, ♂ RV, int. lat., ant. hinge; fig. 3, ♀ RV, int. lat., post. hinge; fig. 4, ♂ RV, int. lat. showing soft parts.

Scale A (25 µm ; ×400), figs. 1, 2; scale B (25 µm ; ×540), fig. 3; scale C (100 µm ; ×170), fig. 4.

Remarks: A certain amount of confusion existed in the last century between *Cytherura gibba* and *Cytherura* (now *Semicytherura*) *cornuta* Brady, 1868 (op. cit., p. 445) as can be seen from the synonymy above. The latter, however, has a more pronounced and pointed caudal process, a median hinge element that is crenulate at both ends and a line of concrescence which curves strongly forward in the posterior part of the valves. In addition, the males of *Semicytherura cornuta* are much wider than the females presumably in order to accommodate their bulky copulatory organs. These differences also epitomise the dissimilarities between the two genera they represent. It is still however curious to note that the male of *C. gibba* remains comparatively narrow when the copulatory appendage (Pl. 1:50:278, fig. 4) comprises over half of the total soft parts of the ostracod.

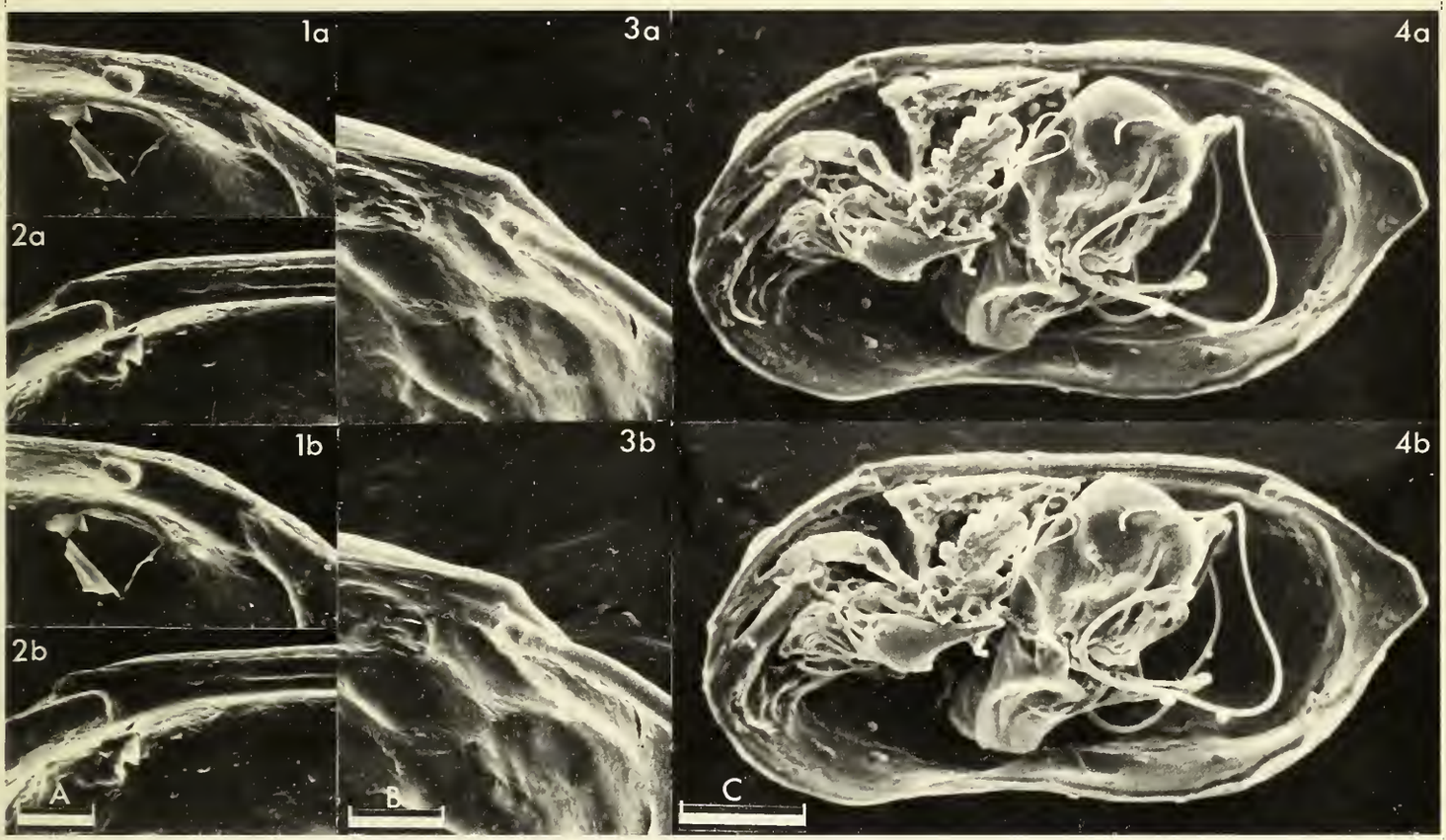
Distribution: Ecology: Its ecology is best summarised by Sars, 1925 (op. cit., p. 201) when he states that *C. gibba* is " . . . a brackish-water form, being found most abundantly in places where the salinity of the water is much reduced". Living records suggest that it is confined to the coasts of the British Isles, NW Europe (N as far as S Norway) and the Baltic. Stratigraphical range: Pleistocene - Recent.

Explanation of Plate 1:50:280

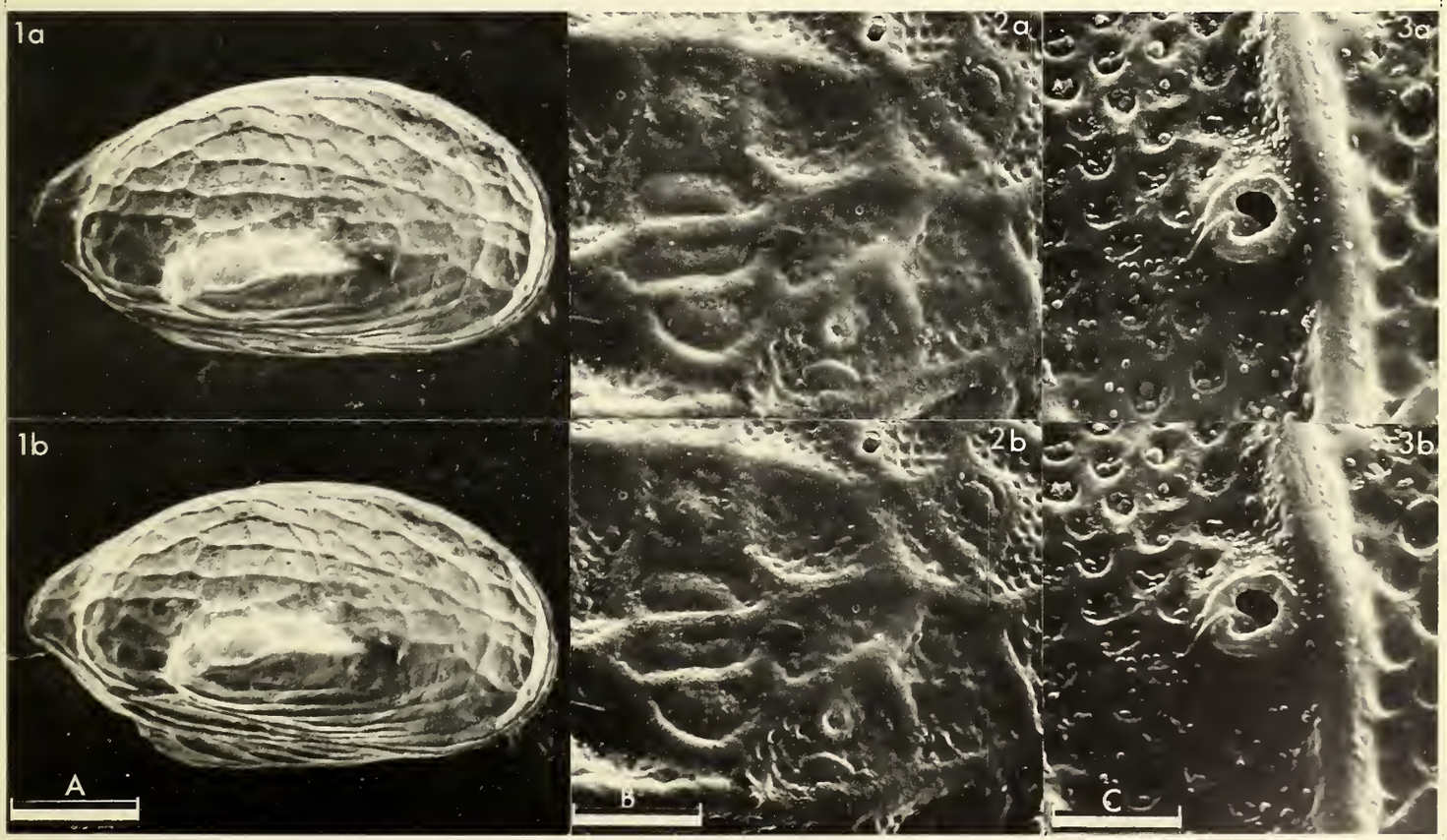
Fig. 1, juv-1 car., ext. rt. lat.; fig. 2, ♀ car., ext. lat. showing musc. sc. pattern interfering with external ornamentation; fig. 3, ♂ car., mid-post. region showing a simple pore and seta.

Scale A (100 µm ; ×170), fig. 1; scale B (50 µm ; ×600), fig. 2; scale C (10 µm ; ×1700), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:50:278 *Cytherura gibba* (6 of 8)



Stereo-Atlas of Ostracod Shells, 1:50:280 *Cytherura gibba* (8 of 8)



595.337.14 (116.222) (425.45:162.001.52 + 425.5:162.001.52 + 425.72:162.002.51): 551.313.1

ON *MARSLATOURELLA BULLATA* BATE

by R. H. Bate
(British Museum (Natural History), London)

Marslatourella bullata Bate, 1967

Marslatourella bullata sp. nov. R. H. Bate, *Bull. Br. Mus. nat. Hist. (Geol.)*, vol. 14, p. 56, pl. 18, figs. 5-14; pl. 19, figs. 1, 2 (1967).

Holotype: Brit. Mus. (Nat. Hist.) IO 2573, ♀ RV.

Type locality: Upper Estuarine Series (Middle Bathonian), Ketton Portland Cement Quarry, Rutland, England; Nat. Grid Ref.: SK 972059.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 2573 (♀ RV: Pl. 1:51:282, fig. 1), IO 5970 (♀ LV: Pl. 1:51:282, fig. 2), IO 5973 (♂ RV: Pl. 1:51:282, fig. 3), IO 5972 (♀ LV: Pl. 1:51:282, fig. 4), IO 2575 (♂ car.: Pl. 1:51:284, fig. 1), IO 2576 (♂ car.: Pl. 1:51:284, fig. 2), IO 5971 (♀ LV: Pl. 1:51:284, fig. 3).

Explanation of Plate 1:51:282

Fig. 1, ♀ RV, ext. lat. (specimen 0.69 mm long); fig. 2, ♀ LV, ext. lat. (specimen 0.71 mm long); fig. 3, ♂ RV, int. hinge (specimen 0.79 mm long); fig. 4, ♀ LV, int. hinge (specimen 0.77 mm long).

Scale (250 µm ; ×85), figs. 1-4.

Figured specimens (contd.): Specimen IO 2573 from Upper Estuarine Series, Ketton Portland Cement Quarry, Rutland; Nat. Grid Ref.: SK 972059. IO 2575-6 from Upper Estuarine Series, Kings Cliffe, Northamptonshire; Nat. Grid Ref.: TL 012966. IO 5970-2 from Hampen Marly Beds, Woodeaton, Oxfordshire; Nat. Grid Ref.: SP 535122. IO 5973-4 from White Limestone, Milton-under-Wychwood, Oxfordshire; Nat. Grid Ref.: SP 255156.

Diagnosis: Eye tubercles low; two stubby ventro-lateral alae developed on each valve.

Remarks: The hinge of *Marslatourella* has always been regarded as antimerodont (Malz, *Senckenberg. leth.*, 1959, Bate 1967) but scanning electron-micrographs now reveal that the dentition of the median element becomes coarser terminally as in the genus *Cytheropteron*. The hinge type is artioperatodont (Bate, *Palaeontology, Spec. Paper* no. 10, 85 pp., 27 pls., 1972). The frontal muscle scar may be either rounded or crescent-shaped. *M. bullata* differs from *M. exposita* Malz by its larger size (*M. exposita* has an average length of 0.51-0.59 mm), stubby rather than broad alae and absence of a distinct anterior marginal border.

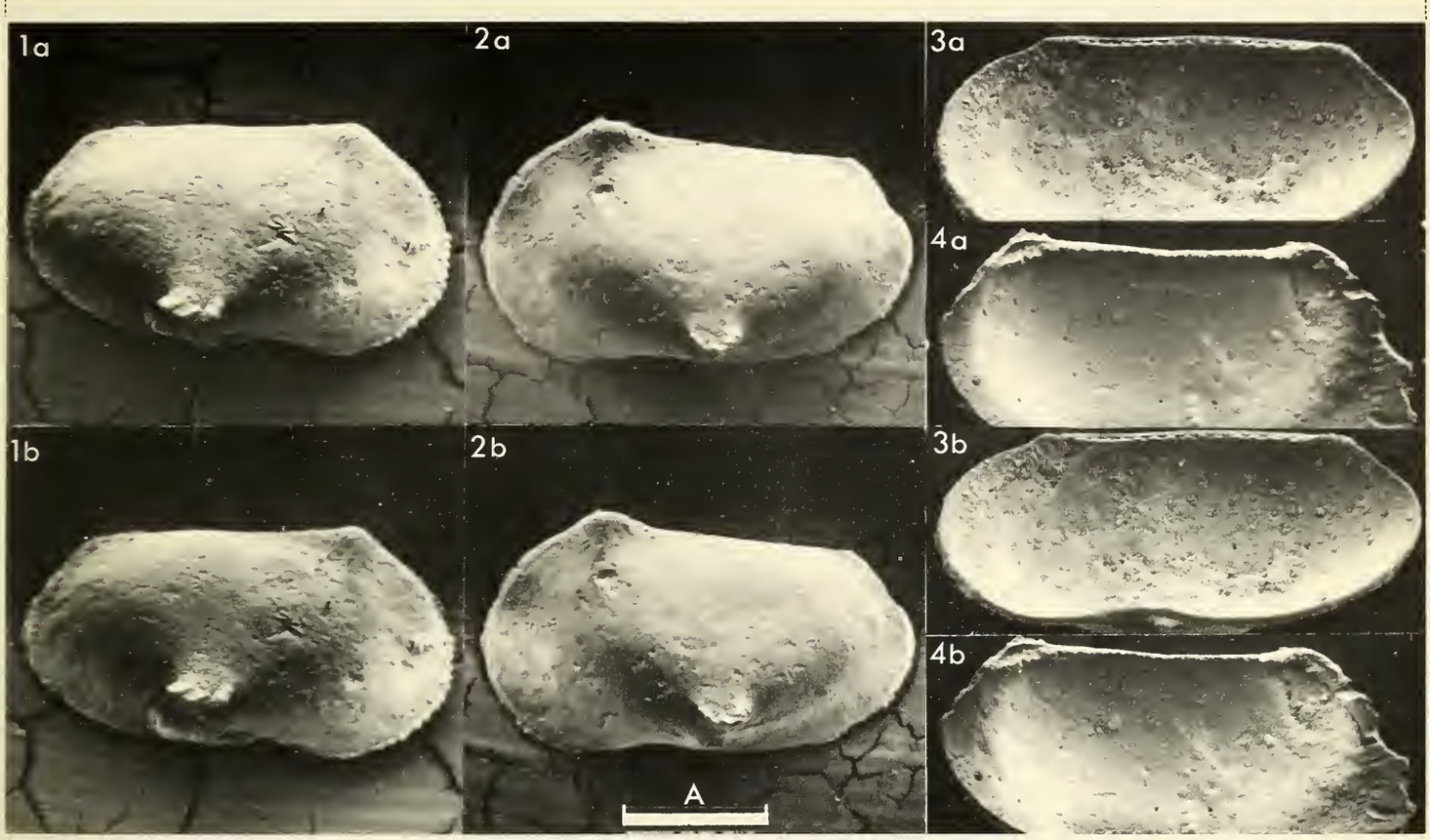
Distribution: *M. bullata* has so far only been recorded from the Middle Bathonian where it is a good indicator of brackish-water conditions.

Explanation of Plate 1:51:284

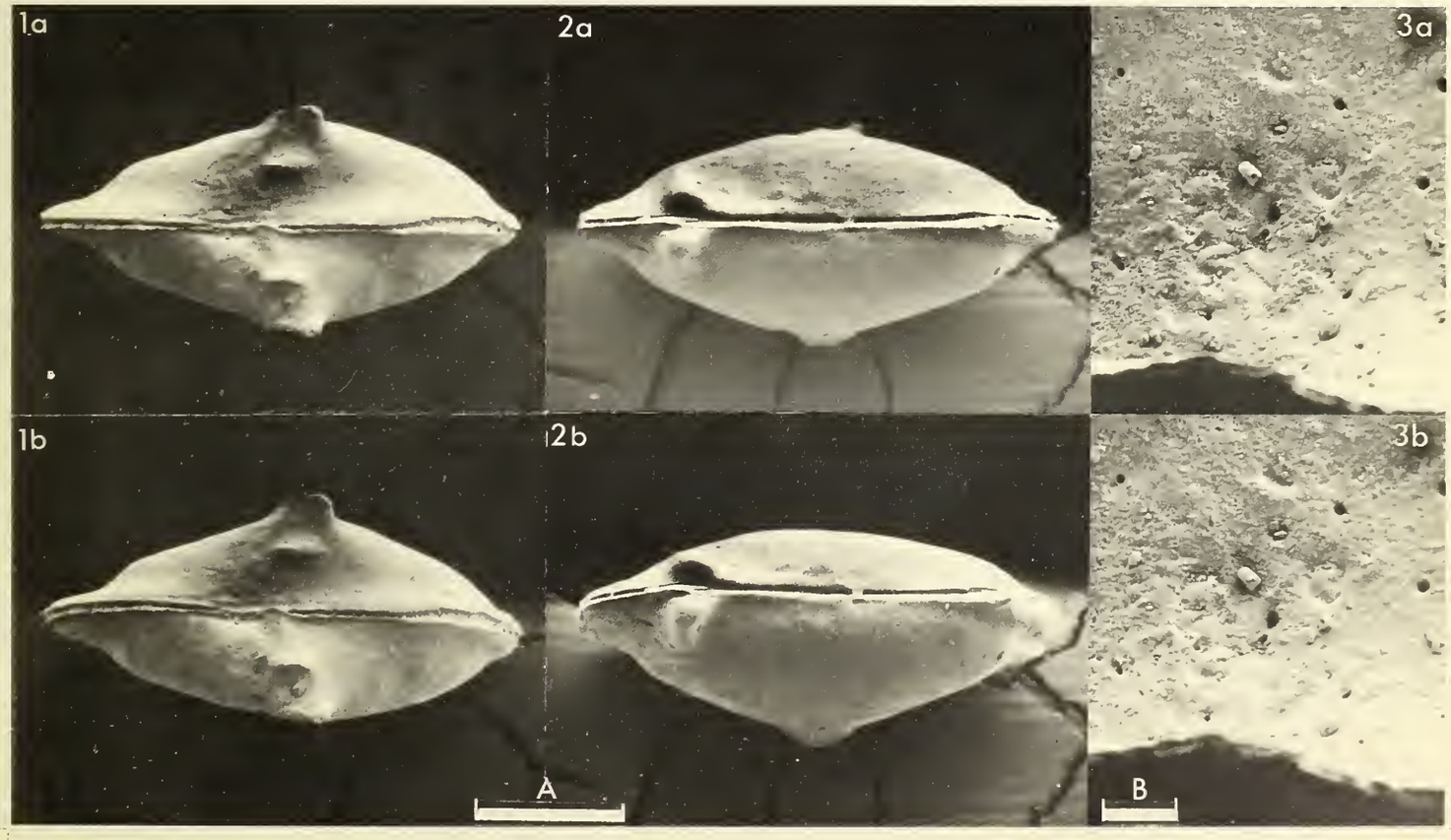
Fig. 1, ♂ car. vent. (specimen 0.78 mm long); fig. 2, ♂ car. dors. (specimen 0.77 mm long); fig. 3, ♀ LV, int. musc. sc. (specimen 0.74 mm long).

Scale A (250 µm ; ×85), figs. 1, 2; scale B (50 µm ; ×300), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:51:282 *Marslatourella bullata* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:51:284 *Marslatourella bullata* (4 of 4)



ON *MARSLATOURELLA DORSISPINATA* BATE AND STEPHENS sp. nov.

by R. H. Bate and Jill Stephens
(British Museum (Natural History), London and University College Wales, Aberystwyth)

Marslatourella dorsispinata sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) IO 5975, RV.

Type locality: Shipton-on-Cherwell, Oxfordshire, England; Nat. Grid Ref.: SP 48071748. Fimbriata-Waltoni Clay, Bladon Beds, Upper Bathonian.

Derivation of name: With reference to the dorsal spine.

Figured specimens: Brit. Mus. (Nat. Hist.) IO 5975 (RV: Pl. 1:52:286, fig. 1; Pl. 1:52:288, figs. 2, 4), IO 5977 (LV: Pl. 1:52:286, fig. 2), IO 5978 (juv RV: Pl. 1:52:286, fig. 3), IO 5979 (LV: Pl. 1:52:288, figs. 1, 3), IO 5980 (LV: Pl. 1:52:288, fig. 5). Specimen IO 5975 from Bladon Beds (Fimbriata-Waltoni Clay), Upper Bathonian, Shipton-on-Cherwell, Oxfordshire; Nat. Grid Ref.: SP 48071748. Remaining specimens (paratypes) from the Wychwood Beds (Upper Bathonian), Shipton-on-Cherwell, Oxfordshire; Nat. Grid Ref.: SP 47581736.

Explanation of Plate 1:52:286

Fig. 1, RV ext. lat. (specimen 0.77 mm long); fig. 2, LV ext. lat. (specimen 0.69 mm long); fig. 3, juv RV, ext. lat. (specimen 0.55 mm long).

Scale A (250 µm ; ×90), figs. 1-3.

Diagnosis: Eye stalked with terminal lens and collar. Two blade-like ventro-lateral alae and single dorso-median spine on each valve. Small subsidiary dorsal spines may be developed. Hinge well developed artioperatodont.

Remarks: *M. dorsispinata* is a very rare ostracod of which only single valves, largely fragmentary, have been found. Sexual dimorphism observed in the other species of *Marslatourella* has not been found here. The large blade-like dorsal spine and the stalked eye tubercle are characteristic of this ostracod; only one specimen has been found having the postero-dorsal spine illustrated. The artioperatodont hinge, only weakly developed in *M. bullata* Bate, 1967 (see *Stereo-Atlas of Ostracod Shells*, vol. 1, pt. 4, pp. 281-284, 1973), is here strongly developed. A small subsidiary scar is situated in front of the oval frontal muscle scar, a variation of the rounded or crescent-shaped frontal scar recorded from *M. bullata*.

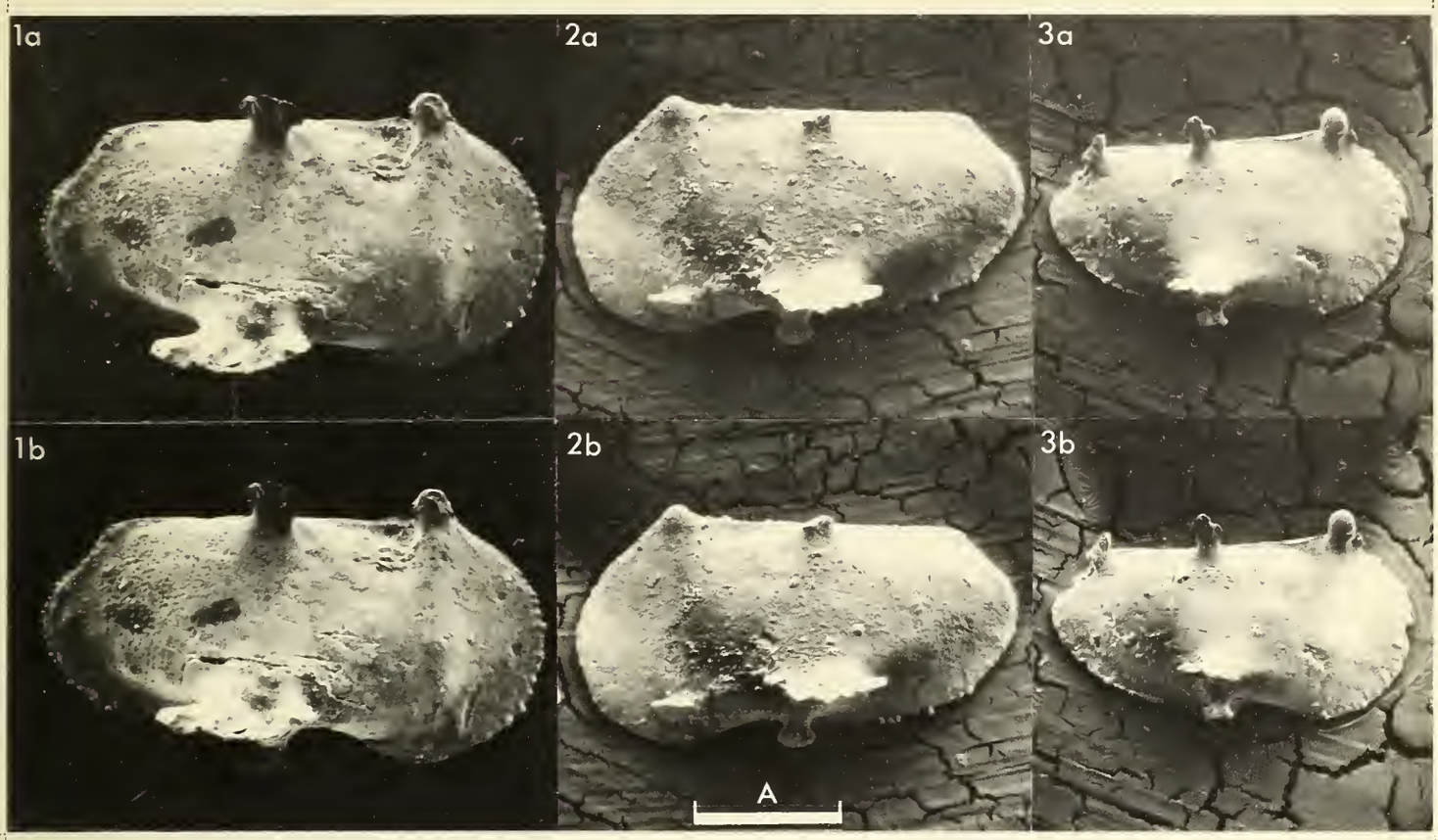
Distribution: Although *M. dorsispinata* has been found in the Middle Bathonian Hampen Marly Beds it is essentially an Upper Bathonian species occurring in both the Wychwood and the Bladon Beds. As for *M. bullata* it appears to favour a brackish-water environment.

Explanation of Plate 1:52:288

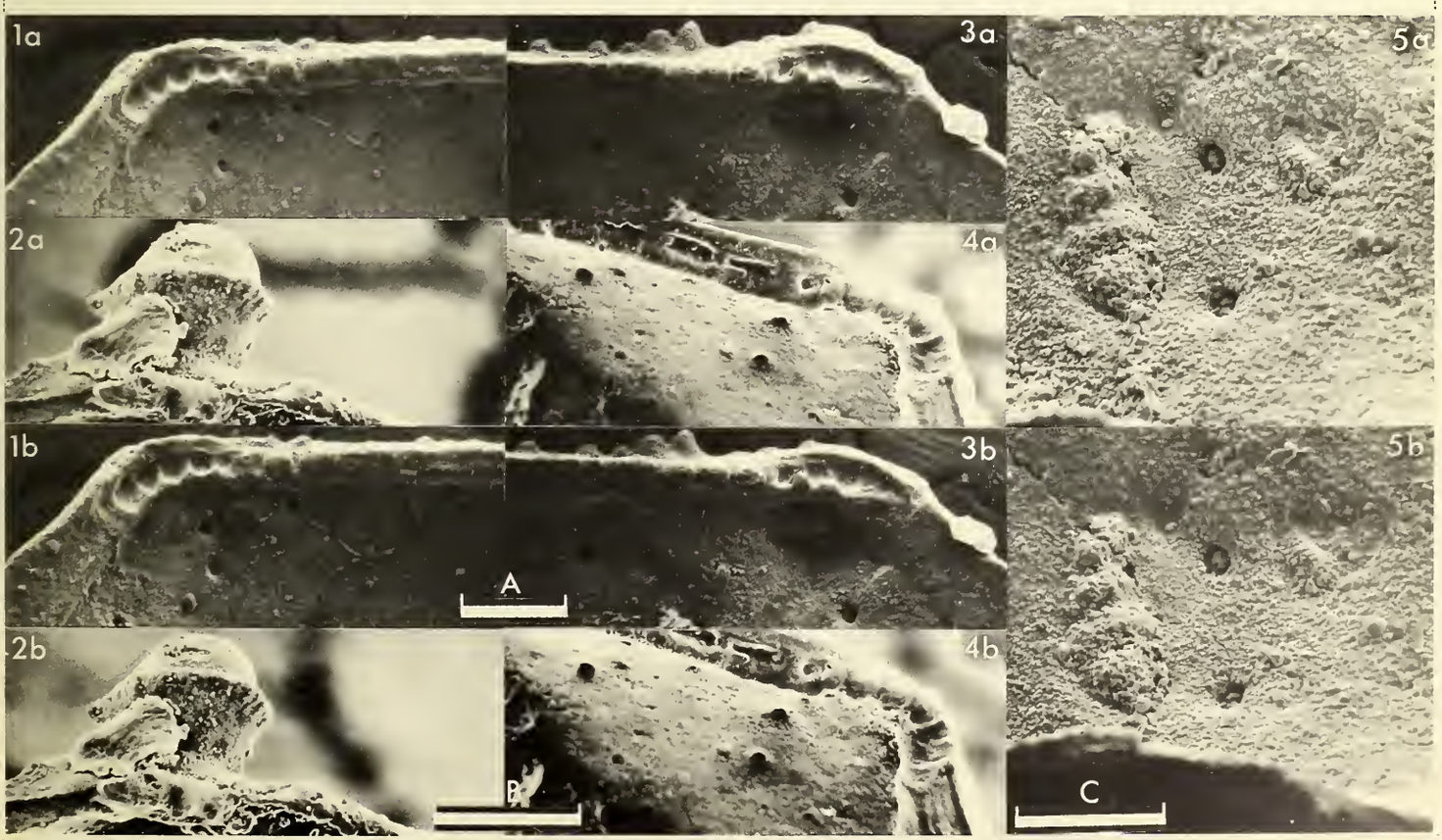
Fig. 1, LV, post. hinge elements (specimen 0.64 mm long); fig. 2, RV, ant. hinge elements, eye stalk (specimen 0.77 mm long); fig. 3, LV, ant. hinge elements (specimen 0.64 mm long); fig. 4, RV, post. hinge elements (specimen 0.77 mm long); fig. 5, LV, int. musc. sc. (specimen [broken] 0.61 mm long).

Scale A (50 µm ; ×392), figs. 1, 3; scale B (50 µm ; ×448), figs. 2, 4; scale C (50 µm ; ×504), fig. 5.

Stereo-Atlas of Ostracod Shells, 1:52:286 *Marslatourella dorsispinata* (2 of 4)



Stereo-Atlas of Ostracod Shells, 1:52:288 *Marslatourella dorsispinata* (4 of 4)



595.337.14 (116.312) (425.3:162.001.53): 551.35 + 552.52

ON *ACROCYTHERE HAUTERIVIANA* (BARTENSTEIN)

by John W. Neale
(University of Hull, England)

Genus *ACROCYTHERE* Neale, 1960

Type-species (original designation): *Orthonotacythere hauteriviana* Bartenstein, 1956

Acrocythere hauteriviana (Bartenstein, 1956)

Orthonotacythere hauteriviana H. Bartenstein, *Senckenberg. leth.*, vol. 37, pp. 532-3, pl. 3, figs. 80, 81 (1956).
Orthonotacythere (Acrocythere) hauteriviana Bartenstein; J. W. Neale, *Micropaleontology*, vol. 6, p. 213 (1960).
Acrocythere hauteriviana (Bartenstein) s.s.; J. W. Neale, *Micropaleontology*, vol. 8, p. 458, pl. 12, figs. 4-8, 10-12 (1962).
Acrocythere hauteriviana (Bartenstein, 1956); J. Gründel, *Freiberger ForschHft.* C. 200, *Paläontologie*, p. 31, pl. V, fig. 17 [q. v. for fuller synonymy including earlier open nomenclature] (1966).

Explanation of Plate 1:53:290

Fig. 1, ♀ LV, ext. lat.; fig. 2, ♂ LV, ext. lat.

Scale A (250 µm ; ×117), fig. 1; scale B (250 µm ; ×99), fig. 2.

Holotype: Senckenberg Museum Coll. SMF. Xe 2380.

Type locality: Nettleton, Lincolnshire. Lower Tealby Clay, Hauterivian, Lower Cretaceous.

Figured specimens: University of Hull coll. nos. HU.13.C.25 (♀ LV: Pl. 1:53:290, fig. 1), HU.13.C.26 (♂ LV: Pl. 1:53:290, fig. 2), HU.13.C.27 (♀ RV: Pl. 1:53:294, fig. 1), HU.13.C.28 (♂ RV: Pl. 1:53:294, fig. 2), HU.13.C.29 (♂ RV: Pl. 1:53:292, fig. 1), HU.13.C.30 (♀ LV: Pl. 1:53:292, fig. 2), HU.13.C.31 (juv LV: Pl. 1:53:292, fig. 3), HU.13.C.32 (♂ LV: Pl. 1:53:296, fig. 1), HU.13.C.33 (♀ RV: Pl. 1:53:296, fig. 2), HU.13.C.34 (♀ LV: Pl. 1:53:296, fig. 3). Hauterivian, Lower Cretaceous from the Lower Tealby Clay of Nettleton, Lincolnshire.

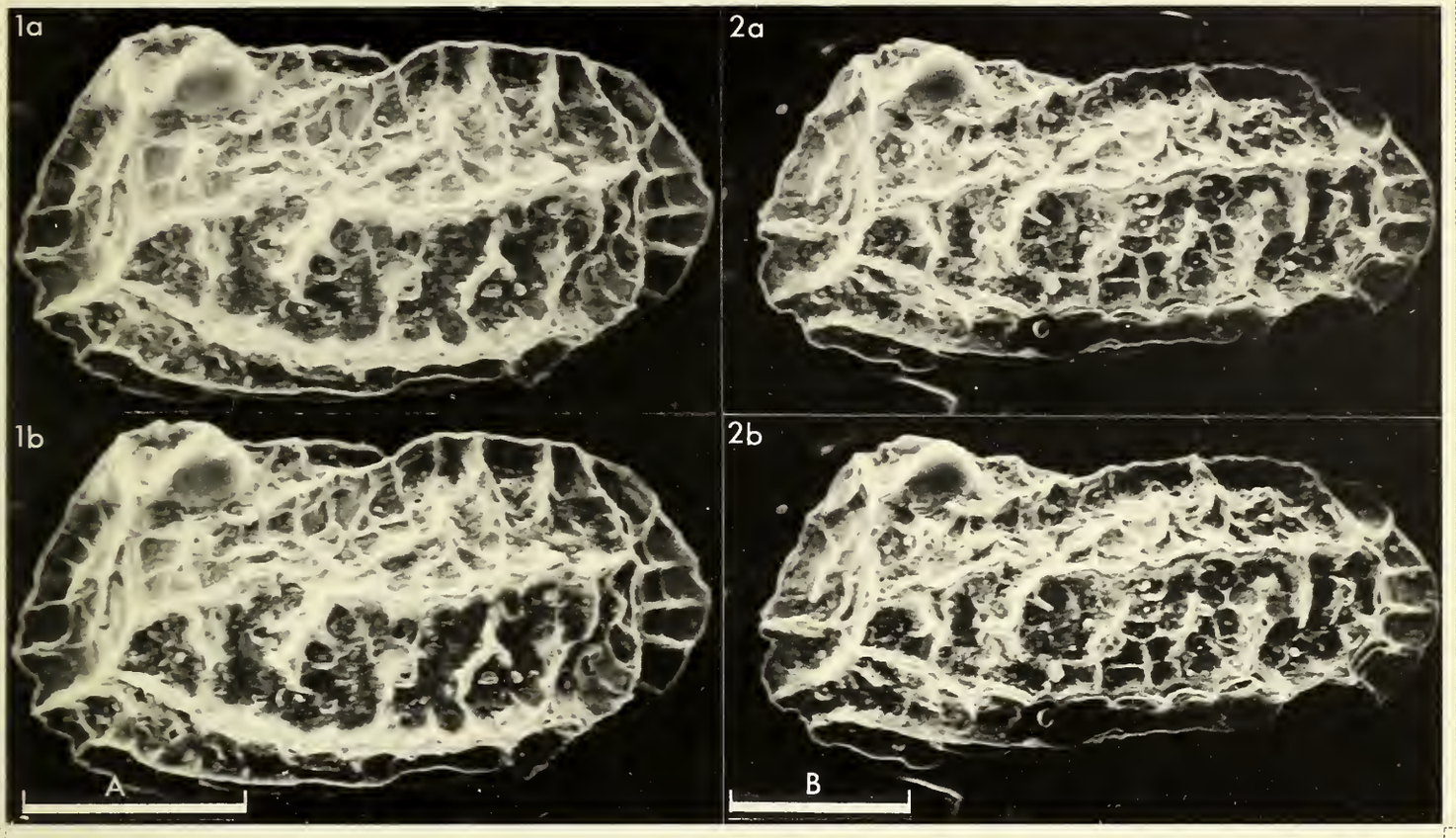
Diagnosis: The mid-rib of this reticulate and strongly costate species is disjunct, the posterior part turning downwards anteriorly at about one-third the length of the valve.

Explanation of Plate 1:53:292

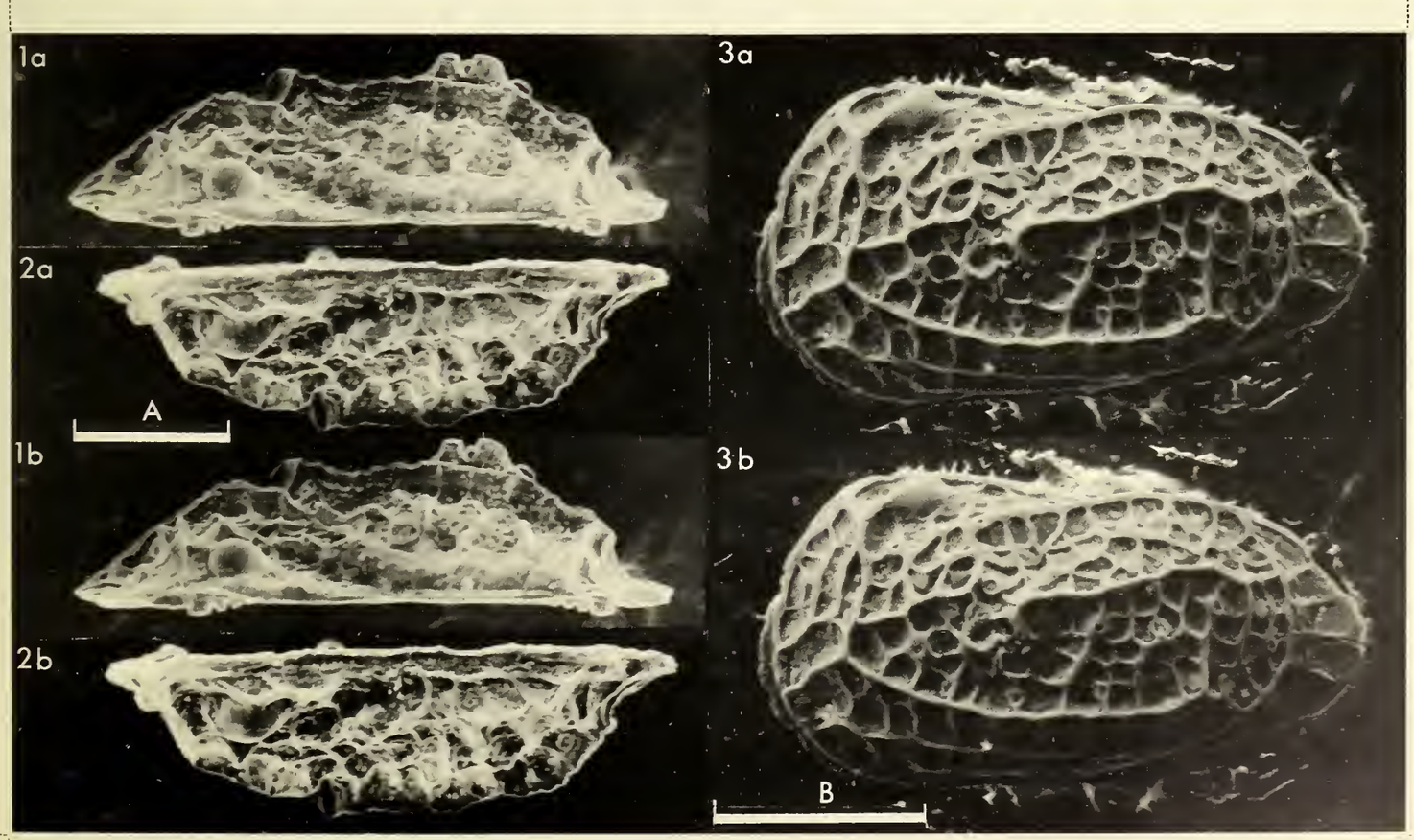
Fig. 1, ♂ RV, dors.; fig. 2, ♀ LV, dors.; fig. 3, juv-l LV, ext. lat.

Scale A (250 µm ; ×90), figs. 1, 2; scale B (250 µm ; ×122), fig. 3.

Stereo-Atlas of Ostracod Shells, 1:53:290 *Acrocythere hauteriviana* (2 of 8)



Stereo-Atlas of Ostracod Shells, 1:53:292 *Acrocythere hauteriviana* (4 of 8)



Remarks: A number of subspecies have been recognised based on variations in ornamentation. *A. hauteriviana* is most easily differentiated from the Upper Cretaceous Australian homoeomorph *Apateloschizocythere geniculata* Bate (see *Stereo-Atlas of Ostracod Shells*, vol. 1, pt. 4, pp. 297-304, 1973) by the presence of prominent eye tubercles. The figured material is all from the type locality and type horizon and the specimen figured in Pl. 1:53:290, fig. 1 has been selected to match Bartenstein's holotype as closely as possible.

Distribution: This species is very common in the Hauterivian beds of Britain and Germany where it occurs typically in clays and shales which often contain a good deal of glauconite and other iron minerals. It extends up into the Barremian.

Explanation of Plate 1:53:294

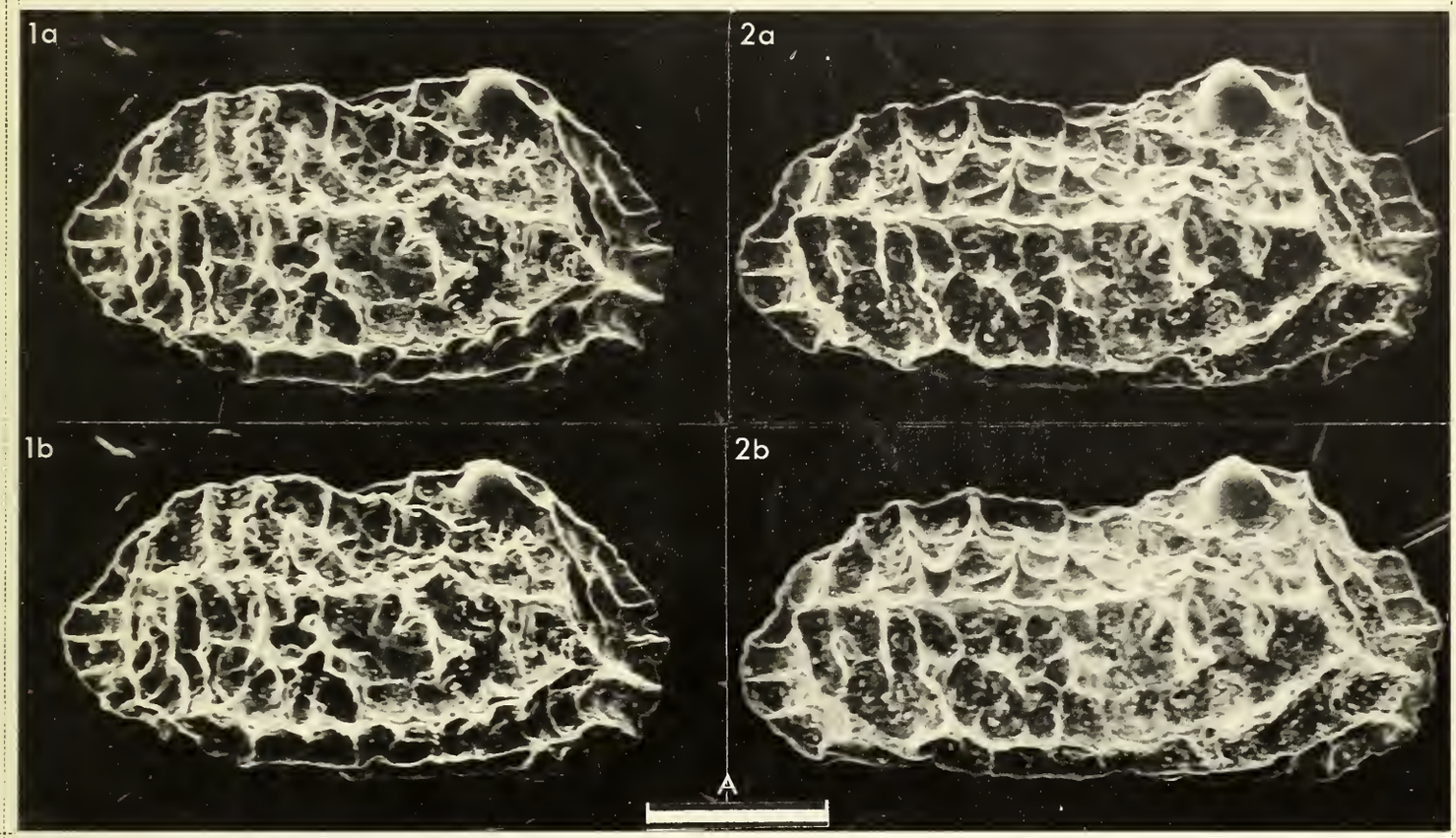
Fig. 1, ♀ RV, ext. lat.; fig. 2, ♂ RV, ext. lat.

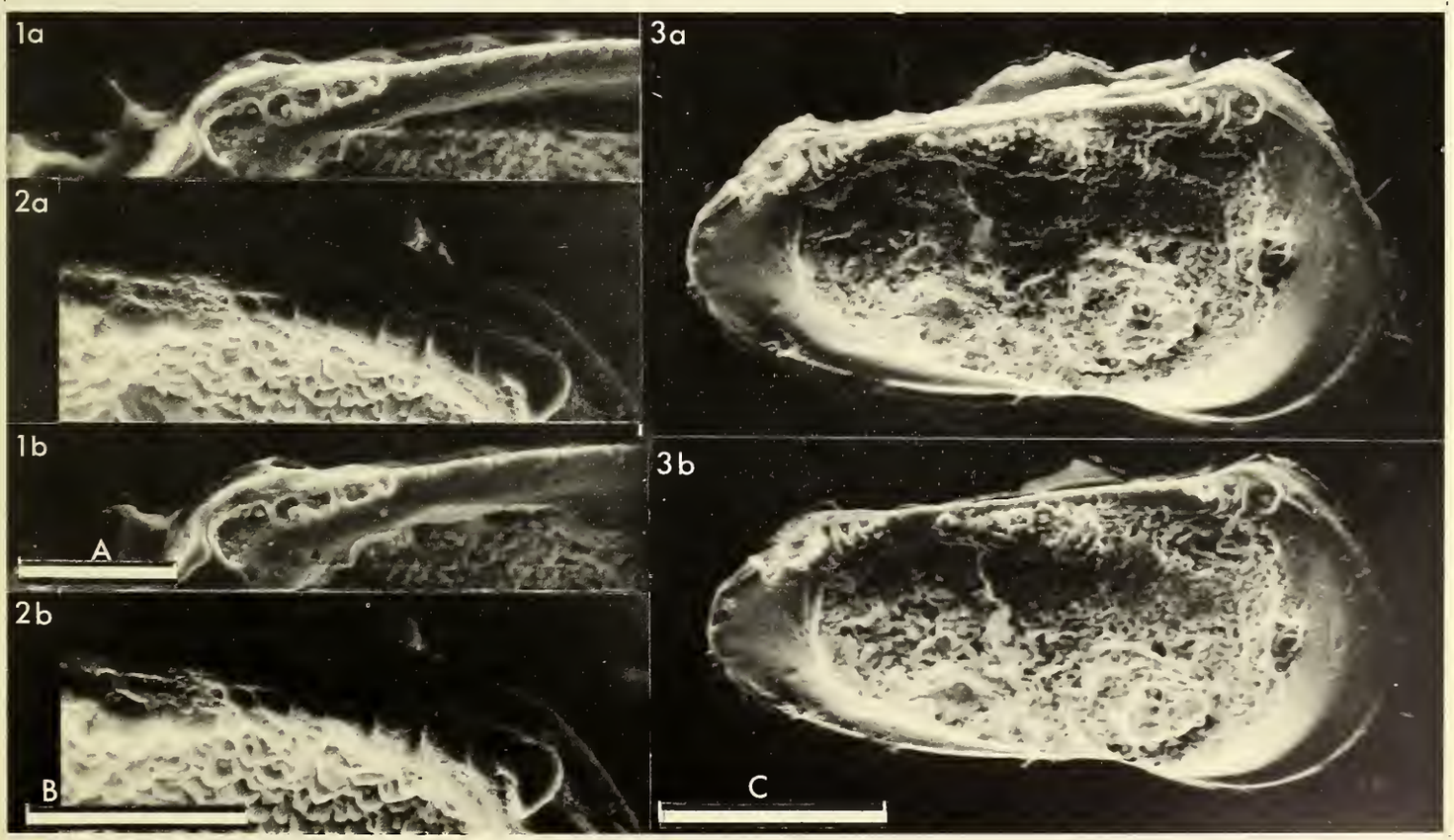
Scale A (250 µm ; ×98), figs. 1, 2.

Explanation of Plate 1:53:296

Fig. 1, ♂ LV, int., post. hinge; fig. 2, ♀ RV, int., post. hinge; fig. 3, ♀ LV, int. lat.

Scale A (100 µm ; ×222), fig. 1; scale B (100 µm ; ×315), fig. 2; scale C (250 µm ; ×124), fig. 3.


1a
2a
1b
2b
A


1a
2a
1b
A
2b
B
3a
3b
C

ON *APATELOSCHIZOCYTHERE GENICULATA* BATE

by John W. Neale
(University of Hull, England)

Genus *APATELOSCHIZOCYTHERE* Bate, 1972

Type-species (original designation): *Apateloschizocythere geniculata* Bate, 1972

Apateloschizocythere geniculata Bate, 1972

Apateloschizocythere geniculata sp. nov. R. H. Bate, *Palaeontology, Spec. Paper* no. 10, pp. 29-32, pl. 7, figs. 5-8; pl. 8, figs. 1-10; pl. 15, fig. 7; text-figs. 17A, B (1972).

Holotype: Brit. Mus. (Nat. Hist.) IO 4465.

Type locality: Yanrey no. 1 borehole, Carnarvon Basin, W Australia; Core 3, 480-500 ft, Toolonga Calcilutite, Sample 3 (Campanian).

Explanation of Plate 1:54:298

Fig. 1, ♀ LV, ext. lat.; fig. 2, ♂ LV, ext. lat.

Scale A (250 µm ; ×125), figs. 1, 2.

Figured specimens: University of Hull coll. nos. HU.64.C.28 (♀ LV: Pl. 1:54:298, fig. 1), HU.64.C.29 (♂ LV: Pl. 1:54:298, fig. 2), HU.64.C.32 (♀ RV: Pl. 1:54:300, fig. 1), HU.64.C.33 (♀ LV: Pl. 1:54:300, fig. 2), HU.64.C.34 (♂ RV: Pl. 1:54:300, fig. 3; Pl. 1:54:304, fig. 2), HU.64.C.35 (♀ LV: Pl. 1:54:300, fig. 4; Pl. 1:54:304, fig. 1), HU.64.C.30 (♀ RV: Pl. 1:54:302, fig. 1), HU.64.C.31 (♂ RV: Pl. 1:54:302, fig. 2). All from the Gingin Chalk, Santonian, Upper Cretaceous of One Tree Hill, Gingin, W Australia.

Diagnosis: A species with reticulate ornamentation, accentuated longitudinal costae with disjunct mid-rib and strong postero-ventral projection of posterior termination of ventral rib.

Remarks: This monospecific genus, not so far found outside W Australia, is a homoeomorph of *Acrocythere hauteriviana* (Bartenstein) (see *Stereo-Atlas of Ostracod Shells*, vol. 1, pt. 4, pp. 289-296, 1973) with similar ornamentation and sexual dimorphism. It is most easily differentiated by the absence of the eye tubercle.

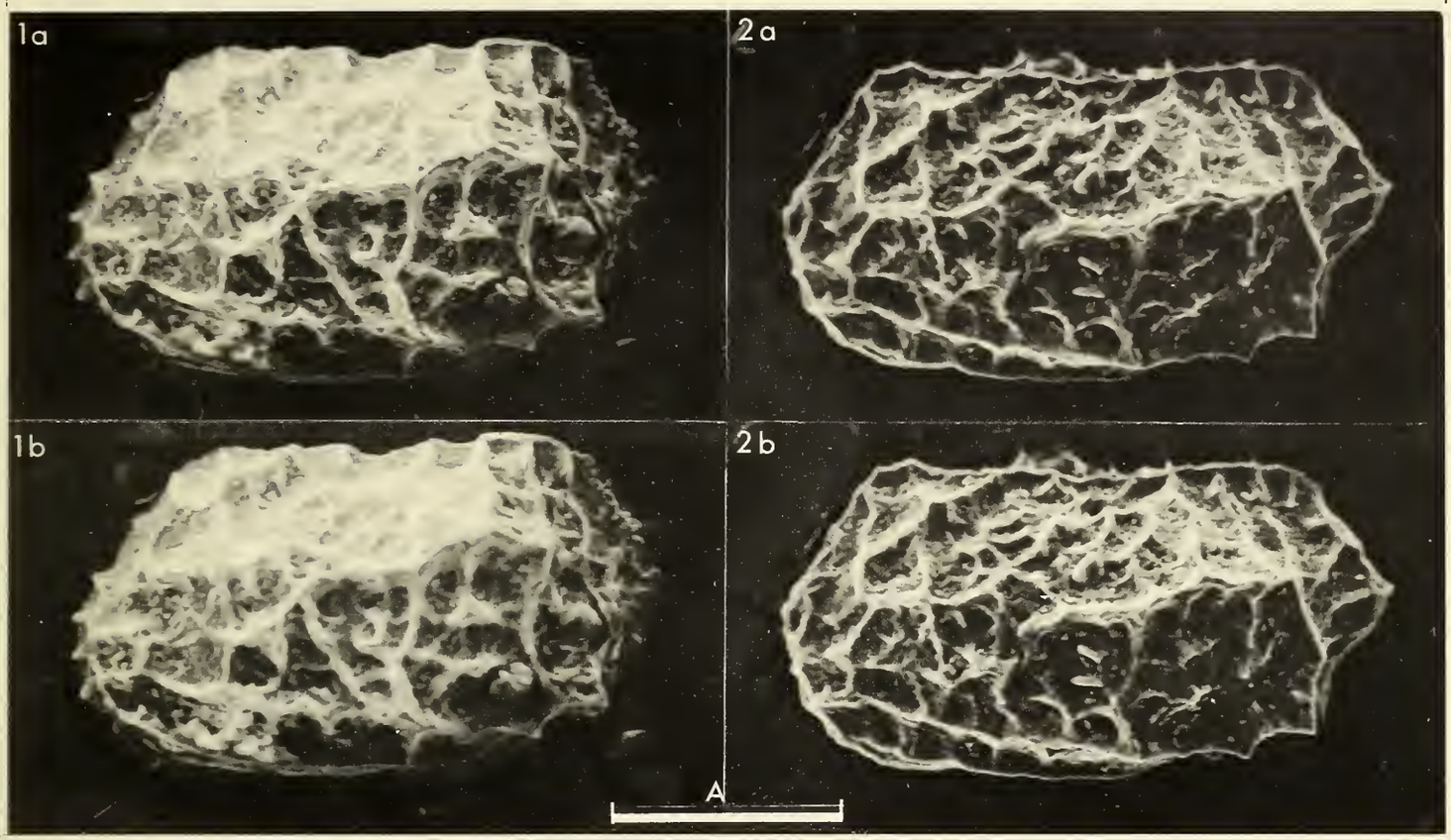
Distribution: Bate (1972) records it from both Santonian and Campanian beds in boreholes in the Carnarvon Basin, W Australia. It is a common species in the fine-grained Gingin Chalk at One Tree Hill where it may form up to 9% of the fauna.

Explanation of Plate 1:54:300

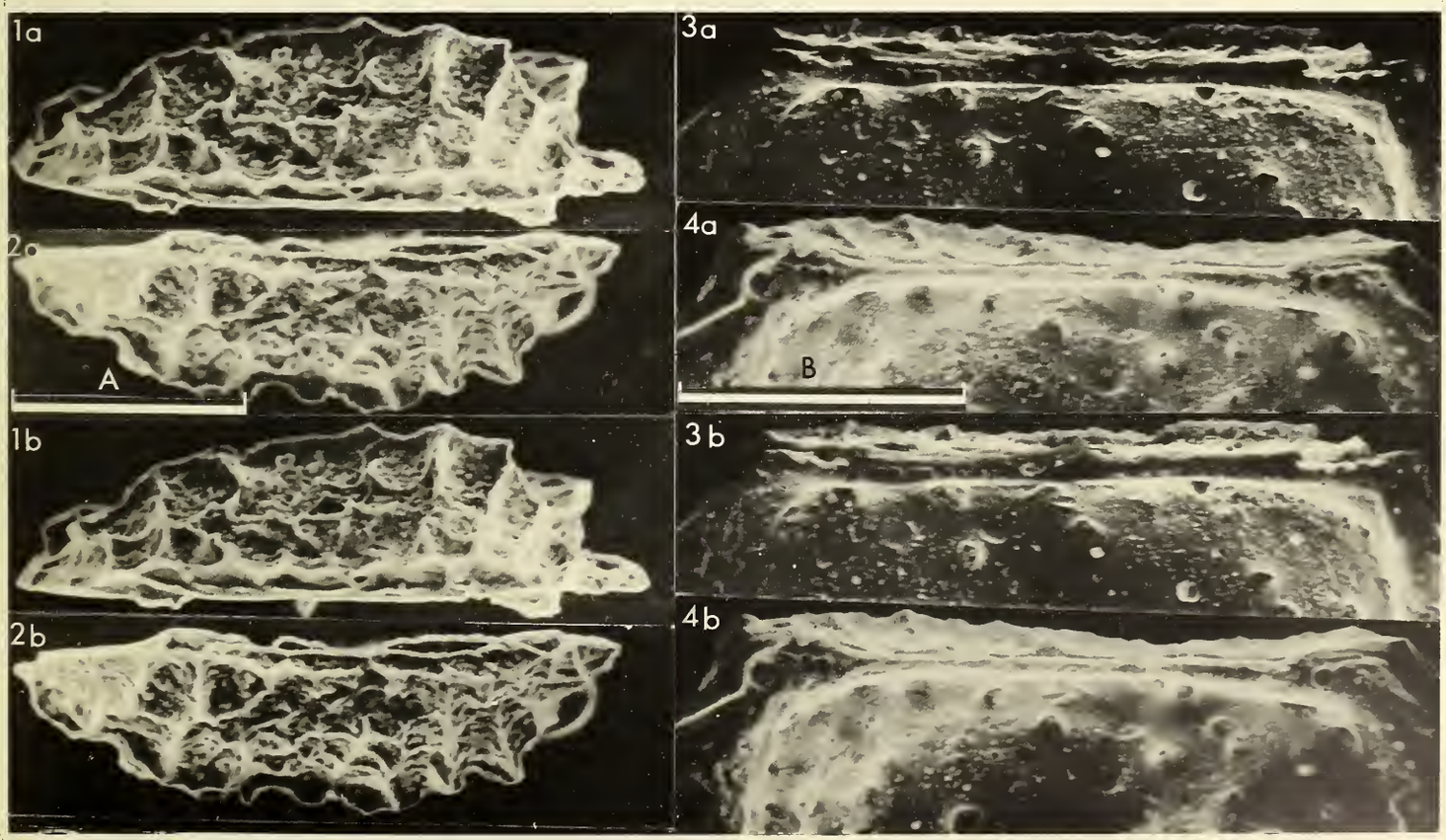
Fig. 1, ♀ RV, dors.; fig. 2, ♀ LV, dors.; fig. 3, ♂ RV, hinge; fig. 4, ♀ LV, hinge.

Scale A (250 µm ; ×132), figs. 1, 2; scale B (250 µm ; ×158), figs. 3, 4.

Stereo-Atlas of Ostracod Shells, 1:54:298 *Apateloschizocythere geniculata* (2 of 8)



Stereo-Atlas of Ostracod Shells, 1:54:300 *Apateloschizocythere geniculata* (4 of 8)



Explanation of Plate 1:54:302

Fig. 1, ♀ RV, ext. lat.; fig. 2, ♂ RV, ext. lat.

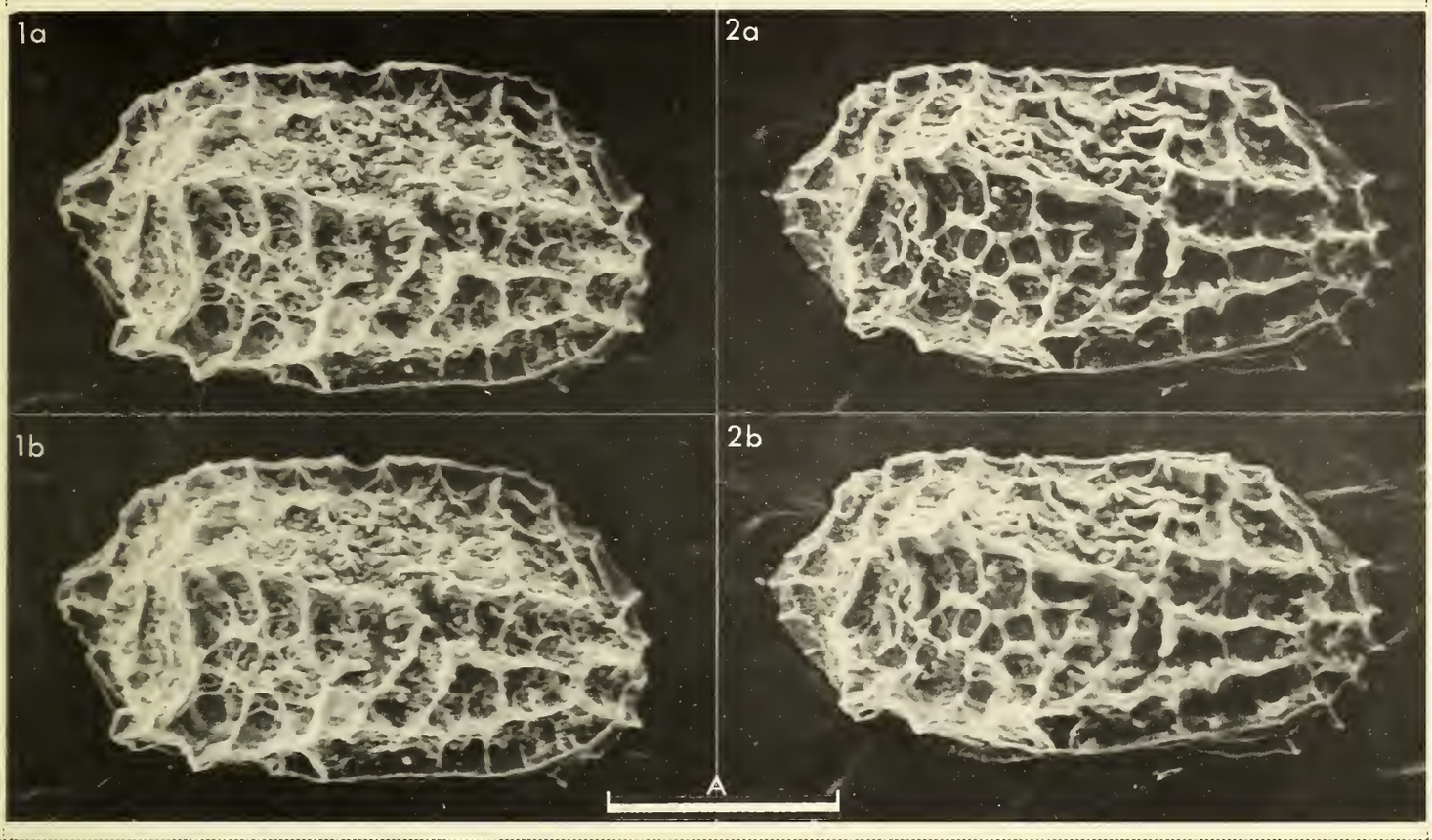
Scale A (250 µm ; ×130), figs. 1, 2.

Explanation of Plate 1:54:304

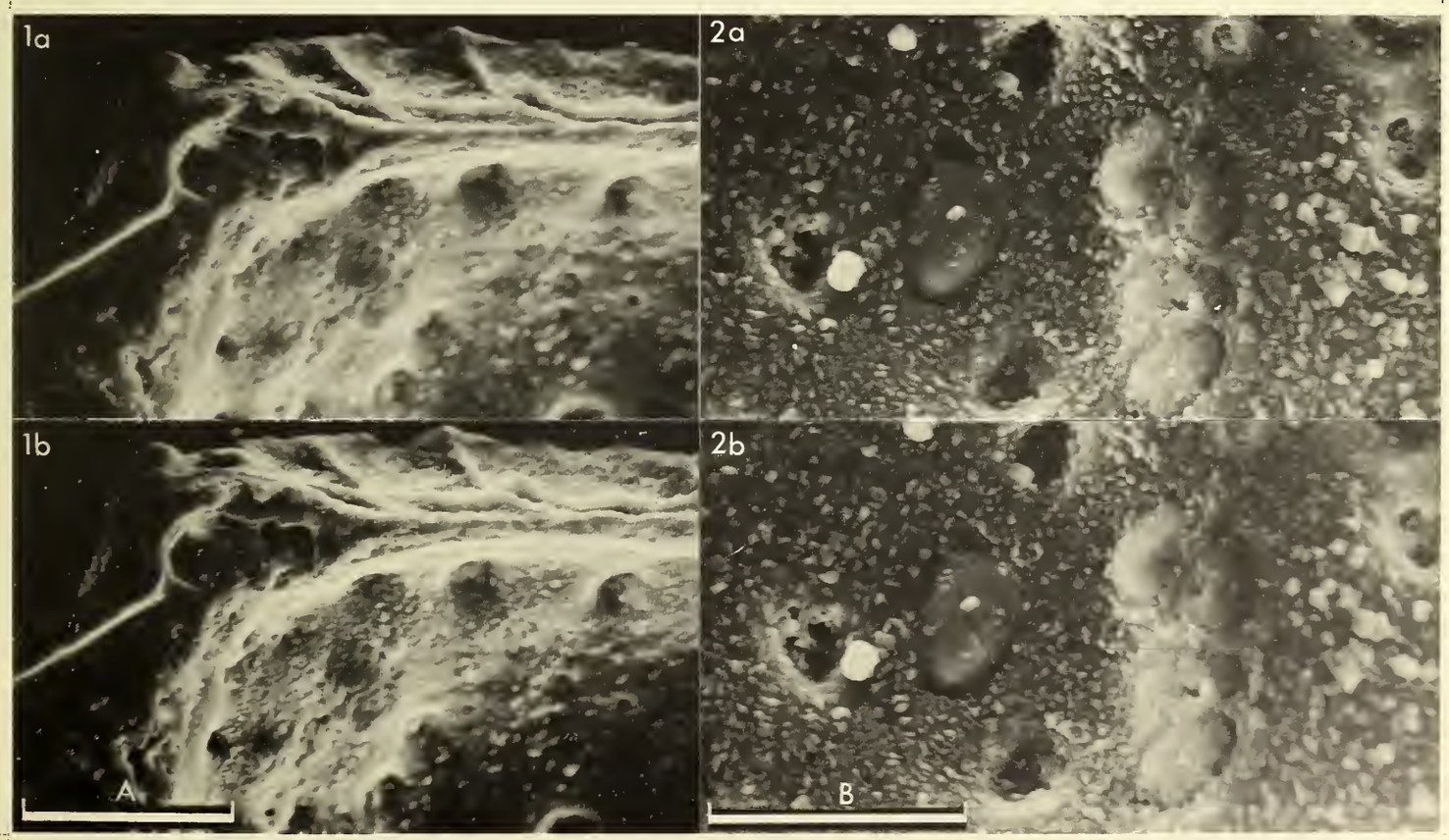
Fig. 1, ♀ LV, int., post. hinge; fig. 2, ♂ RV, int. musc. sc.

Scale A (100 µm ; ×295), fig. 1; scale B (50 µm ; ×705), fig. 2.

Stereo-Atlas of Ostracod Shells, 1:54:302 *Apateloschizocythere geniculata* (6 of 8)



Stereo-Atlas of Ostracod Shells, 1:54:304 *Apateloschizocythere geniculata* (8 of 8)



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STEREO-ATLAS OF OSTRACOD SHELLS
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